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IT'S IN THE CARDS
PAGE 4

SEPTEMBER 1961

Our Product is safety, our process is education, and our profit is measured in the preservation of lives and equipment.

approach

SEPTEMBER 1961
VOLUME 7 NUMBER 3

Two of the Navy's newest fighters, McDonnell F4Hs, streak through the blue. These Phantom 11s of VF-101 Det. Alfa are being maintained by a new maintenance system described in this issue.

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APPROACH, the Naval Aviation Safety Review

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HAIL AND FAREWELL

With this issue, APPROACH regretfully says "so long" to a key member of its staff—Commander David M. Hume, who has served the Navy and the Center well for two years as Managing Editor of APPROACH. He distinguished himself in performing the myriad of inspiring and perspiring duties which fall to M.E.—author, critic, coordinator, father confessor, to name but a few.

Commander Hume, who is now attending Naval War College at Newport, R.I., was succeeded by Commander Thomas A. Williamson, whose wealth of aviation and journalistic experience will help influence the future course of what we hope is your favorite aviation safety magazine.

LIFT and DRAG

Paper Programs

A BRIEF report of BuWeps aviation safety officers' observations made during Inspector General surveys of 34 Naval and Marine Air Stations and associated outlying aviation facilities was presented. Major observations were:

a. Many commands have excellent safety programs on paper, but many fail to follow up instructions and orders to insure compliance on a daily routine basis. Very seldom were officers or chief petty officers observed on the ramps or flight lines actively engaged in supervision of the men during ground servicing of aircraft or maintenance.

b. Adequate command attention is being given to the in-flight and pilot education aspects of aviation safety.

c. Inadequate inspection and supervision of the airfield, shoulders, overruns, runway arresting gear, control tower, ramp areas, and maintenance shops was a common discrepancy noted.

d. Stations inspected which had a successful and effective aviation safety program had a relatively senior officer assigned the billet of aviation safety with primary responsibility to conduct the station's safety program. Those stations with weakest programs and most glaring discrepancies had in every case assigned the aviation safety program to a junior officer in the operations department as a collateral duty.

e. There appears to be a need to transpose the emphasis and command attention given accident prevention by the higher level Aviation Safety Council system into down-the-line station supervision in areas where the work is done and accidents are bred.—*Report on Aviation Safety Environment on Air Stations —(BuWeps)*

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LETTERS TO THE EDITOR

Stopper

NAAS Chase Field, Beeville, Texas—Just prior to takeoff from CVS-36 for Plane Guard duties I entered the HRS-3 chopper to assist another crewman, a hospital corpsman, in preparing the rescue sling. While inside the aircraft I noticed a rag had been stuffed into a small innocent-looking hole to prevent drops of oil from falling on him. The hole contained the up and down stops for the collective.

This could have been very dangerous had a takeoff been attempted.

I recommend that a cover be manufactured to be placed over this opening.

THOMAS J. PECKHAM ADR-2
Maint. Line Div.

VFR Rules

Long Beach, Calif.——June 1961 APPROACH, p 3, "Maintaining VFR During Practice GCA," local base rules notwithstanding, for the portion of the practice GCA on a VFR flight which is within a control zone, Civil Air Regulations Part *60.31 Special VFR minimum weather conditions in control zones* would allow VFR flight to "remain clear of clouds" when clearance is obtained from air traffic control and providing ground and flight visibility is not less than one mile.

D. L. VAN HANDEL, GYSGT., USMC
VMF-123, NAS, Los Alamitos

Tacan Error

FPO San Francisco—I read with much interest "Tacan" by Major Adams in the May 1961 issue. Recently inbound to my Homeplate in an F8U (in visual weather conditions), I detected unreliability of the tacan station. This was manifested by a bearing error to the right and garbled identification code. Your article was most timely in my case.

On page 28 there appears to be an inaccuracy, however, The third caption in the AN/ARN-21 Instrumentation figure should read, "Radio Magnetic Indicator shows Magnetic Bearing to Station (050) and Aircraft Heading (060)."

The June 1961 issue had no correction on this item which prompts me to write.

R. W. PEARD
Logistics Officer. VMCJ-1
MAG 12, 1st MAW

● Reader Peard has a sharp eye. The referenced figures were lifted from the USAF Instrument Flying Manual (AF Manual 51-37).

MoRest Record?

MCAS Cherry Point—We of VMA-332, employing the A4D-2N read with interest the well written Morest article in the June issue. We established what we think is a Morest record on 27 May when the pilots of this unit made 173 arrested landings in a six-hour and 45-minute period.

It was practice for pending carrier qualifications and we think that it speaks highly for the Mobile Arresting Unit and the personnel who operate the equipment at Cherry Point.

R. M. COOKE, Capt, USMC

● Congratulations on your performance, however we know you feel a "record" must be looked upon simply as a byproduct of a job well done, and not the ultimate aim of the operation.

Writer's Cramp

Pensacola—On page 43 of the May 1961 issue of APPROACH there is an article entitled "So Write," which states that, "There probably isn't a mechanic with more than two years in the business who hasn't invented a tool or a procedure or a gizmo that makes maintenance quicker and easier." *This is probably true.*

The article also states that not many have ever written about it to APPROACH and attributes this NOT to a reluctance to share, but to an unwillingness to write. *This is also true.* And now we come to the beeeg question. WHY are they unwilling to write?

The answer seems perfectly obvious, but, since you don't seem to have it, the following may serve to clear things up a little for you:

1. Of all the thousands of inventions, procedures, and ideas that have been developed, how many enlisted Navy men have ever received any kind of public recognition for their efforts? How many monetary awards have been given? How many times has the credit for the invention or procedure been usurped by an officer, with the attendant publicity? (I can name you half a dozen big ones!)

2. Why does the USN Civil Service, practically all big businesses, the U.S. Air Force military and civilian, the U.S. Army military and civilian, and the U.S. Coast Guard military and civilian, have beneficial suggestion programs with the attendant public recognition and monetary awards which are so richly deserved? Surely it can be seen, with half an eye, that these programs repay our government a thousandfold for the time and effort involved.

3. Then, why doesn't the Navy have such a program for its enlisted men?

If you were just writing to fill up space, deep-six this letter and forget the whole thing. But, if you would really like to know why those inventions and ideas are not being submitted, print this letter and ask the men concerned for their comments.

And, if you should be successful in instituting a beneficial suggestion program for the Navy's enlisted men, I'll bet you will receive so many ideas that you won't be able to process them all.

B. L. OSTERBERG, LT, USN (RET.)

● Your letter is being forwarded to BuWeps for action. Although suggestions such as yours have been

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request. Address: APPROACH Editor, U. S. Naval Aviation Safety Center, NAS Norfolk, Va. Views expressed are those of the writers and do not imply endorsement by the U. S. Naval Aviation Safety Center.

made before they have never led to an incentive award program for naval personnel similar to those you mention. Perhaps by publication of your letter, we may open the door for more letters and fodder to institute such a program.

Helo-DD Communications

Monterey—In a discussion with a DD type he passed on a couple of gimmicks he'd seen used in Helo ops at sea particularly regarding the continuing difficulty of choppers to get DD to take up a suitable course for helo approach. This gent suggested that the carrier direct DD to "fall in behind angel for best recovery course," which would permit chopper to dictate same by moving out ahead.

Of course this would not be applicable always, but would serve to relieve some of the painful communications process of getting some boys to head out in right direction. In addition, it was suggested that flag-hoists be used more frequently, vice voice advisories—such as: Launch Helo Desig.————(DD) —Two-block hoist on lift off. . . .

R. P. BREWER, CDR

Murphy in M-B

Farafield—One preflight check on the Martin-Baker ejection seat in an FJ-4B is to insure that the eye on the end of the small cable (from the secondary ejection handle) is on top of the eye on the large cable (from the face curtain). A perfect example of a potential Murphy.

Why not design the two eyes so that they cannot be installed improperly, or hasn't M-B heard about Murphy?

ANYMOUSE

For Transparent Fuel Hoses

NAS Miramar—In regards to letters in the June 1961 issue of APPROACH, referring to the article "Wrong Type or Grade of Fuel." One measure that may be employed to avert these mistakes would be to insert a plastic, transparent and pliable section in the refueling hose at the operator's nozzle end thus giving a visual check of the color of the fuel being dispensed.

That is assuming that all different grades and types of fuel are of distinctly different color.

ROBERT L. WRIGHT, AO2

● NASC poster B43-GI-557 is a useful reminder for identifying fuels grades by color. These have been distributed to all activities. An updated poster is scheduled.

Project SCAN—A System to Collect and Analyze Near Collision Reports

The Federal Aviation Agency recently signed a contract with the Flight Safety Foundation, New York City, to develop a pilot reporting program for obtaining data on incidents in which mid-air collisions have barely been avoided in the opinion of pilots and controllers. The program called *Project SCAN* which will cover aircraft operations in the fifty states, the District of Columbia and Puerto Rico, went into effect on 1 July 1961.

The FAA Administrator said, "The conclusions and recommendations of the Foundation's independent analysis will be used by the FAA in its continuing campaign to improve air safety and will supplement, but not supersede FAA activities in the same area. *We pledge that these reports will not be used as a basis for punishing the reporter.*"

This program was developed in collaboration with the Civil Aeronautics Board. The Chairman of the Board has described the program as one which promises to make a substantial contribution to the improvement of our air traffic system.

Under the terms of the contract, the Flight Safety Foundation will establish a uniform nationwide system for the reporting of near-mid-air collisions and related incidents by pilots and aircrews in civil and military aviation, and will set up a system for periodic reporting and data analysis. An interim report will be delivered to the FAA after five months of operation, and a final report will be delivered within sixty days after the end of the program. These reports will contain the Flight Safety Foundation's findings and recommendations resulting from the program.

Reports submitted to the Flight Safety Foundation, under terms of the contract *will be kept confidential*, but a pattern of incidents indicating a need for prompt attention or corrective action to avoid repetition will be reported to the FAA without delay. The analysis of incident patterns will be interpreted as they relate to engineering and flight operations factors.

The importance of the "confidential" classification of the reports is that they will not be available to the FAA for possible enforcement action. However, where information of a violation of a Civil Air Regulation is obtained by other means, the fact that the incident was voluntarily reported to the Flight Safety Foundation will not preclude enforcement action initiated on the basis of such other information.

The Flight Safety Foundation also will develop an educational program encouraging alertness to collision hazards and will set up suggested procedures for avoiding them.

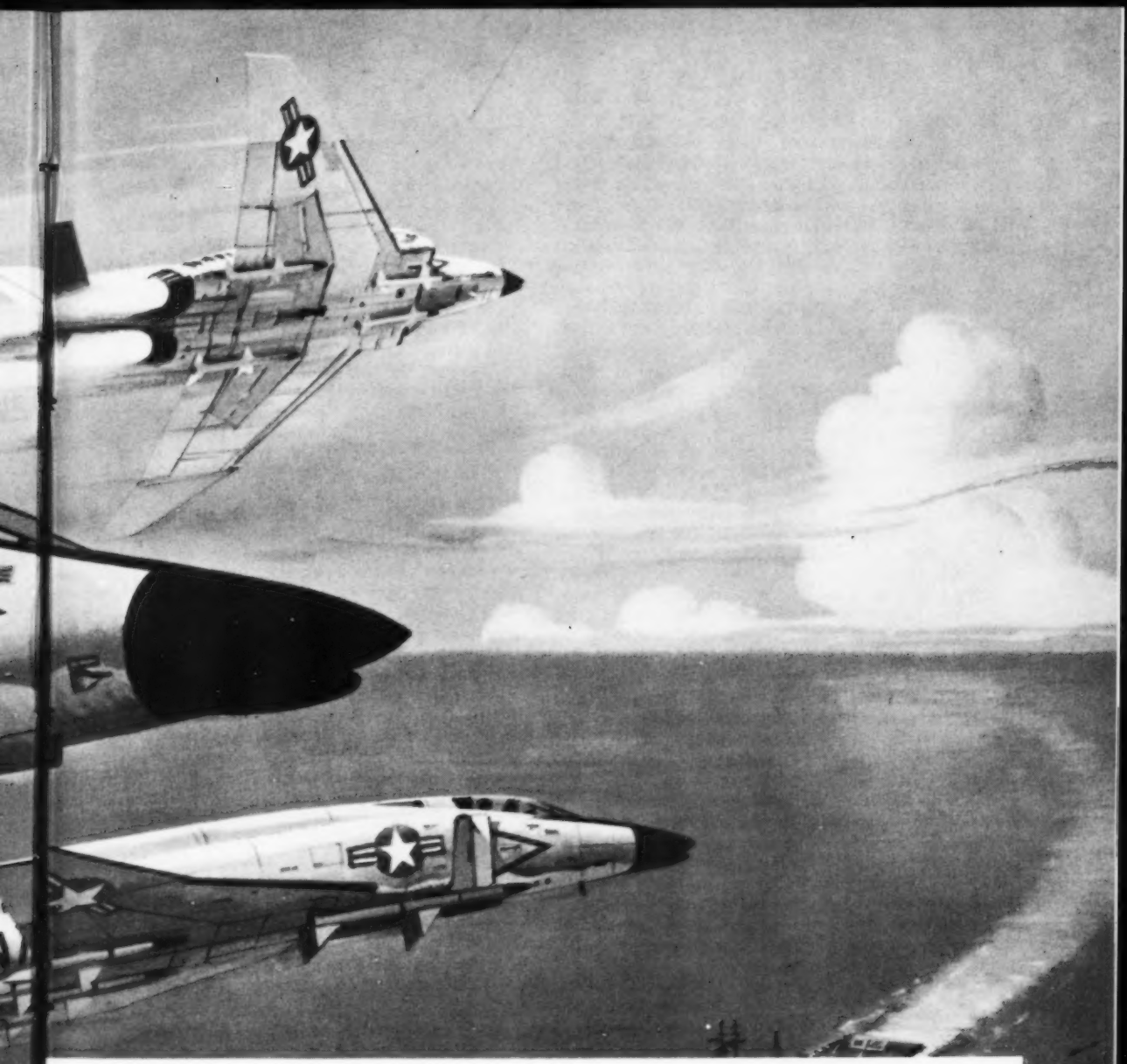
The Foundation has announced that forms and information necessary to implement this program are now being distributed throughout the country.

—Weekly Summary

The New Look in Aircraft Maintenance Management and Its Relation to Safety

'IT'S IN THE CARDS'

by LCDR Charles H. Barfield M&M Dept. NASC



Much has been said in the last few years regarding aircraft maintenance personnel and procedures and their relation to, and impact on, the overall Naval Aviation Safety Program.

Statistically it has been shown that maintenance error contributes to an average approximating only 8 per cent of the overall annual accident rate.

When considered separately this percentage seems, and is, small! However, when considering the dollars and personnel loss it becomes considerable: for example during the last period studied, 1 July 1960 through 31 December 1960, 42 aircraft were lost or sustained major damage and 19 personnel were killed or sustained serious or critical injury. The price tag for the aircraft was 7,200,000 dollars—and of course no price tag can be attached to this loss of life.

Most of us are fully aware of the above maintenance error picture, its primary causes and the procedures that must be utilized to combat this aspect.

But most of us are not fully aware of the "behind the scene action" which has been and is being taken to improve the maintenance safety pic-

ture and also to obtain improvements in the overall maintenance concept. If we are to maintain pace with our accelerated world wide operational commitments and increased maintenance workloads within a more austere basis, it has been determined that new management and procedural concepts and systems must be devised, installed and actively pursued. So not only must we get the optimum out of every available maintenance manhour and every piece of equipment, but this must be done with maximum efficiency and safety.

Fine, you say! But how do we obtain this near Utopia? Well you can be assured that it won't be as easy as it sounds. But it will be easier than it has been in the past, provided we address ourselves to the problems at hand as true professionals. If we are not professionals, we must become such. And as such we must also be prepared to adapt to the newest concepts which have been determined necessary to cope with the changing times and needs.

So! What'd he say? Well, as a matter of fact nothing much as yet which you can get your teeth into. But wait—we are coming to that just as soon as the "softening up" process is carried a bit further.

Quite some time back it was determined that standardization in maintenance is a must.

The Naval Aircraft Maintenance Program was designed and initiated for this purpose. The Organization and Procedures Manual (BuWeps Inst 5440.2) for Class C, D, E, and F maintenance activities was issued as part of the NAMP. This Manual provides standardization by defining the scope and responsibilities in the maintenance level where the majority of maintenance manpower and money is expended. A general look at some of the new developments will perhaps provide a better understanding of their intent and the benefits provided to the operating activities of the Navy.

Calendar System of Inspection

During the past 5 or 6 years BuWeps authorized various modifications to the 30-60-90-120 hour periodic inspection. These methods were evaluated and it was found that not only were we overinspecting our aircraft but also that no firm date or time could be established for routine inspections. Increasing the inspection interval and inspecting on firm calendar cycles provides both advantages. BuWeps is adopting the calendar cycle as a primary controlling factor in scheduling inspections, with some exceptions.

A few aircraft now in operation throughout the Navy will not fit into the calendar system. The varied use of the aircraft or the lack of evidence to justify the change to the new system eliminates some fixed wing types.

All aircraft, however, will be affected somewhat by the calendar system. Aircraft on the calendar cycle have a flight hour limitation. Should the flight hour limit be reached prior to the calendar cycle, the next scheduled inspection is performed. Aircraft on an hourly cycle have a calendar limitation as before. The cycles are spaced to allow the inspections to fall within the category assigned.

All aircraft will be assigned their primary and secondary controlling factor by type and model. Some flight hour overtime will be allowed in order to maintain a calendar cycle; however no calendar day overtime is contemplated.

This system will allow maintenance departments to schedule inspections throughout the planned service life of the aircraft. It also provides workload stabilization and maximum utilization of the aircraft and firm dates for support activities to provide parts and equipment.

Scheduled Replacement of Components

The scheduled replacement of components was limited to engines and propellers for many years. The introduction of the helicopter, with its many critical components expanded the requirements. Other components were used as long as performance was satisfactory. Modern aircraft components often are only a part of a complicated and vital system. When a servicable component is removed, additional maintenance costs are incurred. In many cases, however, the removal will save time, provide mission capability and better aircraft utilization with less additional cost than would result if the component was used to failure. Scheduling of component replacement to coincide with the inspection or PAR cycle has definite advantages; therefore a 10 per cent overtime on components is allowed for this purpose. The aircraft Handbook of Inspection Requirements will contain the component replacement schedule.

Which components to schedule for replacement are determined by the consequence of a failure. Criteria established are safety of flight, mission readiness, and economic considerations. Safety of flight is defined as *a component failure preventing the pilot from continuing the flight with sufficient power and control to make a fully controlled landing.* Mission ready components are *those whose failure prevents the accomplishment of the primary mission of the aircraft.* Economic considerations are *failures resulting in damage to the component or other units requiring excessive time or money to return to service.* Components not in the above categories will not be scheduled.

The time to remove the component is determined initially by manufacturers' engineering tests and analysis of wear out patterns. Adjustments to the schedule are made by analysis of failure rates

submitted by FURs and wear patterns established by operational use. A formal review board meeting quarterly, has been established to adjust and update these and other aspects of the maintenance program.

Progressive Aircraft Rework (PAR) Program

The PAR system has been with us for several years; however, a look into its development and objectives will show how it fits into the new maintenance program.

Prior to 1954, all aircraft were assigned a service tour of a set number of months. At the end of this time, the operating activity transferred the aircraft to an Overhaul Activity where it received a major overhaul and then was returned to service for another tour. The planned service life determined the number of tours.

During 1954 and early 1955 an Interim Rework Program was developed for fleet aircraft to eliminate a major overhaul in the early stages of a new aircraft. This plan included an intermediate rework and a major rework prior to performing a periodic overhaul. The aircraft remained in custody of the controlling custodian until scheduled for overhaul.

The present PAR system developed from experience gained from the Interim Rework concept. The purpose of the PAR system is to eliminate the periodic overhaul of operational aircraft by substituting a more frequent and less comprehensive rework. The objective is to provide fleet operational aircraft at a maximum level of readiness and material condition with the minimum out-of-service time.

The PAR is scheduled as a maintenance cycle of the aircraft but may be adjusted to be consistent with training and deployment cycles. The aircraft, under the calendar cycle, completes a set number of maintenance cycles during its service life and the PAR is a part of these as are the intermediate and major inspections. During initial reworks the majority of the manhours are spent modernizing the aircraft. Manhours on later PARs, as the aircraft ages, are spent on a more extensive structural and systems rework. The cycles are based on projected requirements resulting from a continuing engineering evaluation of the aircraft, operational experience and aircraft history.

The amount of time the aircraft is in each rework is determined by the aircraft needs, economical limits of the rework activity and acceptable fleet out-of-service time. The scope and depth of the rework is determined by the prime rework activity in coordination with BuWeps and other rework activities. The rework performed by the PAR activity includes:

Planned examination and rework.

Planned incorporation of modifications.

Installation of all "O" coded changes.

Correction of material discrepancies discovered during rework.

Major calendar inspection.

Special requests from the custodian which have been agreed to by the rework activity.

The maximum benefit from the PAR is gained by utilizing the scheduled time for work that is beyond the capability of the operating activity. Special work requests may be negotiated with the rework activity which are normally beyond the capability and/or capacity of the operating activity. These requests include correction of continuing or unsolved discrepancies, special painting, tests requiring special equipment, etc. These requests are over and above the planned PAR and are submitted on a relative priority list in sufficient time to permit integrated work planning. Cont'd

Pioneering maintenance men of VF-101's Detachment Alpha based at Oceana work the Card System of aircraft maintenance on its new F4H *Phantom IIs*. After a few checks six days were cut from the schedule.

Chief Structural Mechanic H. R. Errington, prepares sequence charts and cards prior to starting check on one of squadron's new F4H *Phantom IIs.*

Scheduled Maintenance Management Program

This program applies to the F4H, A3J and future aircraft. It is designed to provide complete standard instructions for all the aircraft's maintenance requirements. The Maintenance Management Program organizes Class A through F maintenance into one integrated maintenance plan. All fleet and progressive aircraft rework inspection requirements are contained in one document, the Periodic Maintenance Requirements Manual.

Preparation of the manual required an extensive technical and engineering evaluation of the entire aircraft to determine and justify each inspection item. Each item was then analyzed to determine which level of maintenance would perform the work when the item required inspection, what skills were required, and the material and/or equipment necessary. Justification of each item included engineering proof that the item required inspection at the interval originally determined in order to eliminate all unnecessary inspections without compromising safe operation of the aircraft. This program includes sets of Maintenance Requirements Cards and Inspection Sequence Charts for use by the fleet operating activity in scheduling maintenance requirements. Retrofit of this system to earlier aircraft is not contemplated at this time due to the magnitude of the task.

Maintenance Requirements Cards (MRC)

Management control of maintenance is necessary for safe and efficient operations. Organization of the routine functions of maintenance must be accomplished to obtain an efficient and orderly flow of work. The Maintenance Requirements Cards are

Cards are distributed to shop mechanics, l to r, R. C. Moore, AMS-2, W. E. Leonard, AMSAN, J. H. Scott, AMH-2, H. A. Dunlap, AMS-2, and "time out" is logged.

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R. C.
Scott,
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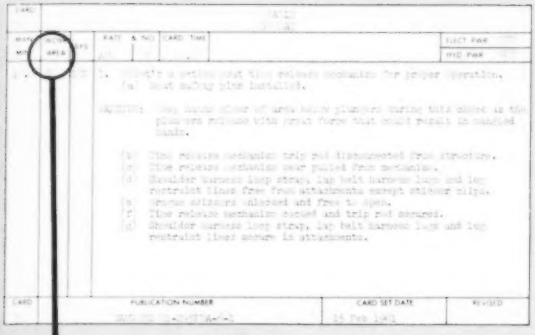
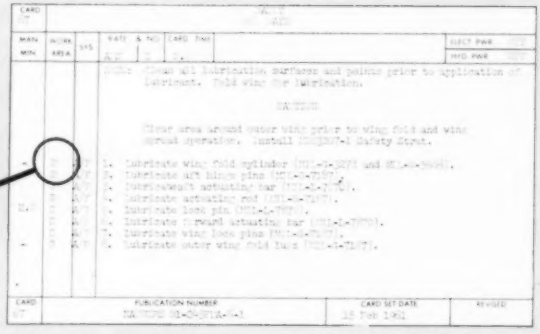
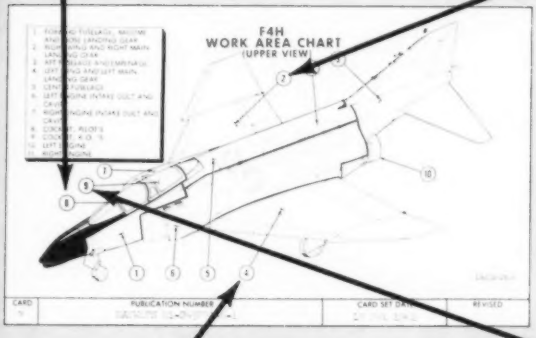






Maintenance Requirements Cards list the work area. When necessary a diagram of the work area is included.

the tools that the supervisor and the mechanic use to organize and insure completion of the required maintenance.

The fleet inspection requirements contained in the Periodic Maintenance Requirements Manual are separated into work increments and printed on 5 x 8 cards. These cards are assembled into sets and numbered in sequence. Sets are provided for each inspection including preflight and daily inspections. Special inspection and quality control cards are also provided as part of the applicable set.

Printed on the card is an itemized list of the work to be accomplished with the time required to complete each item. The card also contains proper torques, settings, adjustments, pressures, test equipment, special tools, material and equipment applicable to the work itemized. A diagram of the work area is included when necessary. The heading of the card contains the type inspection, rate required, work area, aircraft system, total time to complete the card, and electrical and/or hydraulic power requirements.

Completion of the entire applicable set completes the inspection, thereby eliminating the check sheet.

Defining acceptable leakage, system security, proper operation and other general statements by listing specific requirements eliminates considerable time verifying these values from other publications and reduces possible errors or omissions by less experienced personnel.

B. C. Ward, AMS-3 and R. Mosley, AMS-2 complete work as outlined on the card utilizing the tools indicated.

Sequence Charts

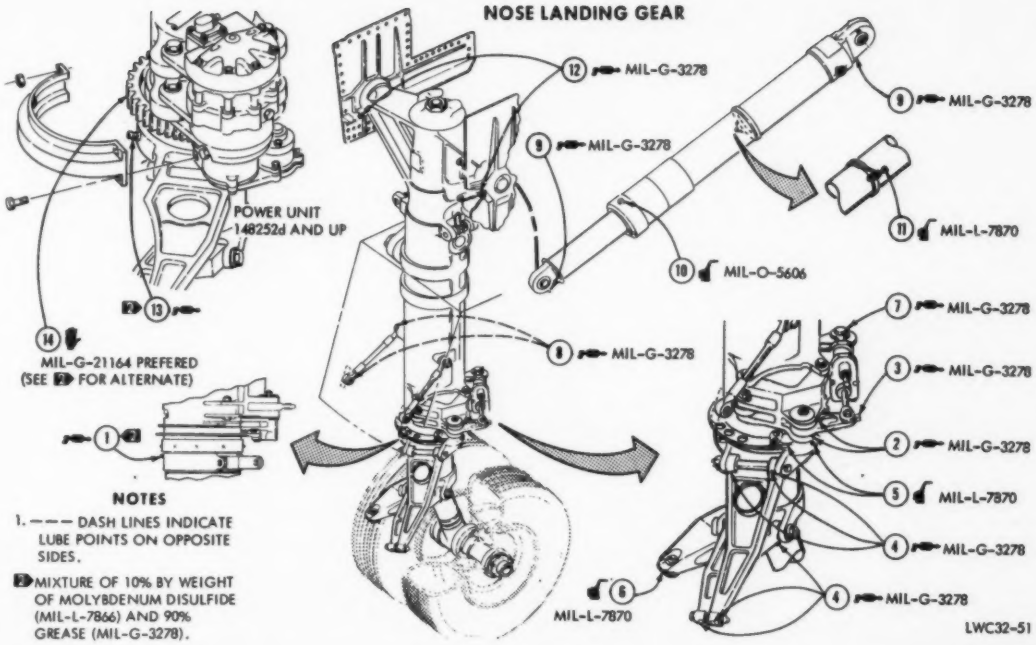
Sequence charts are published as an integral part and used in conjunction with the Maintenance Requirements Cards. These charts are a management tool for scheduling all work performed during the inspection and for monitoring inspection progress. The charts are effective primarily on calendar inspections and are not published for preflight, daily, or special inspections. The chart contains a heading and a time grid body. The heading designates the rating and/or skills required, the card numbers applicable to each skill, a work area diagram, the inspection to which the chart applies, number of charts in the set, and the basic publication and revision date of the chart. Blank spaces are provided to note any special inspection cards which apply to the inspection, the start hour and date, supervisor's name and the aircraft bureau number.

The time grid is divided horizontally into one hour increments. Vertically, on the left of the grid, is a list of the work areas and each member of the maintenance crew by rating.

Card numbers for each work area are shown in the sequence of issue. The horizontal length of the block containing the card number indicates the time required to complete the card. The card number to be issued is also listed on the grid beside the member of the crew who will complete the card. Spaces are provided to indicate when electrical and/or hydraulic power is applied, thus allowing the supervisor to schedule work requiring power at that time.

Discrepancies discovered while completing the individual cards are not corrected when noticed but are scheduled for correction at a later time when the work area is clear. Should the discrepancy be of magnitude that further work cannot be accomplished until it is corrected, the inspection should be stopped until such time as orderly progress can be made.

Proper use of the sequence charts will provide maintenance supervisory personnel with a progressive picture of the course of the inspection. The



As each step in the check is completed the card is returned, the work recorded on the progress chart and new cards drawn.

Check progress recorded on chart is pointed out to Maintenance Officer, LCDR P. W. Utterback.

orderly scheduling and monitoring of the inspection provides maximum manpower utilization, preplanning of requirements, and work load stabilization.

These are some of the more important developments to improve maintenance management and functions. Progress is being made in other areas of maintenance and support. The Naval Air Technical Services Facility is revising the FUR form to obtain more data and for easier preparation. Other changes at NATSF, not apparent to the man with the greasy pencil, are the processing of data by computers instead of punched cards, revised formats for presenting data to BuWeps and other control procedures to insure better utilization of data and increase efforts to correct discrepancies reported. BuWeps is continually updating instructions as experience is gained in the system. Old instructions are being consolidated where possible, to provide complete information and standardization in one document. BuWeps and Supply are continuing efforts to provide necessary support to Class C maintenance activities to provide a more effective repair of components at this level. Each improvement is designed to help integrate the entire maintenance structure into a closely coordinated, fully supported organization in order to gain increased readiness through maximum efficient utilization of facilities, manpower, and material available to naval aviation maintenance activities.

In the final analysis, however, the key factors are the personnel involved. The high degree of readiness with safety required by naval aviation depends on the effective utilization of their skills.

POINT OF NO RETURNS

Quite often some hazards can readily be sidestepped without affecting mission capability one whit. For instance, during an emergency some units must be able to launch aircraft on long tedious missions, recover at a far distant base, reservice, and immediately re-launch. In training for this type activity, nothing is gained by flying practice missions keyed to the emergency mission timetable. All this does is test the endurance of the flight crews when any genius knows that they'd be dog-tired after such a double shuffle. The mission can be nicely simulated by taking a 12- or 24-hour recess for both the aircraft and crew at the intermediate base, then continuing the mission. If no maintenance or flight planning is allowed during the time out period and if an appropriate fudge factor is used, planners and ops officers can tell fairly accurately how well the actual mission would have been hacked without subjecting anyone to the risk.

Whenever a safety officer talks the planners into eliminating or reducing the risk of an operation without reducing the unit's capability to perform the assigned mission, he is doing his job as it should be done. And that brings us to the subject for the month . . . the maintenance accident prevention program. This is a doggone good place to do this sort of work. For anything which will help maintenance people do their work faster and more accurately automatically improves unit capability. Unfortunately, it is a difficult area, where problems and trouble spots are seldom defined clearly. But you can look for trouble signs. Some of the signs are too many repeat write-ups, using incomplete write-ups to clear aircraft discrepancies, haphazard maintenance preflight inspections, too much delayed maintenance and personnel forced to work excessive hours . . . this last just happens to be one of our pet subjects and reminds us of a bridge building project in Great Britain during the 19th Century. A progressive individual ran the work detail on this bridge and found that his men accomplished more work during an eight-hour day than they did trying to work 10 or 12 hours. What was true then holds true today.

Sure, you might get a temporary increase in output by working your people more than eight hours, but in a few days they'll use up their reserve energy and production will drop. When it starts down, you can look for the number of mistakes to increase . . . and there you are behind the old power curve.

Should you, as a safety officer, find someone trying to run this sort of shop, you should make a maximum effort to bring things back into line. Usually this sort of foolishness starts when operational commitments exceed normal maintenance capability . . . so you may find yourself bumping heads with the boss. If so, you may need help. The flight surgeon may be in a position to assist, but if he chickens out, you'll have to call in the reserves, namely the Chaplain. At the very least, he can give you moral support.—*USAF Directorate of Flight Safety*

MONITOR MAINTENANCE

Safety Councils Take a Look at Maintenance

Turkeyed Torque

T2V experienced a flameout while on the downwind leg of the landing pattern. Pilot was unable to make a flameout approach to any runway and ditched. Strike damaged resulted. Both pilots received minor injuries. Probable cause of the flameout was a disconnected fuel line which was installed finger-tight during engine assembly. It was recommended that emphasis be placed on torquing requirements, that formalized quality control inspection procedures be established and that procedures be established for jet engine build-up similar to those in use for reciprocating engines.—*ComFAirQuonset*

Bright Lights Hazard

The NAS North Island LOSER report was discussed. Of main interest was the man who, after being blinded by bright lights in the line area, tripped over an aircraft tie-down and injured himself. The committee noted that in our line area there are many bright lights that could blind linemen or pilots. Persons blinded by bright lights should stop until the lights have been removed or extinguished and vision has been regained.—*VS-29*

Carbon Monoxide Checks

The subject of carbon monoxide checks by issuing activities was brought to the attention of the board. BuAer Instruction 3750.4 outlines the requirements for carbon monoxide checks stating, among other things, that aircraft coming out of modification, overhaul, and storage programs will be subjected to CO tests. It is recommended that this requirement be brought to the attention of issuing activities handling aircraft known to be subject to CO contamination such as AD and T-28 models.—*VRF-32*

Good Equipment Maintenance

An inquiry into the tractor and Tillie operational checks performed and the individuals' qualifications that perform them was directed to the council.

The air officer stated that the maintenance and inspection procedures performed on the ships tractors and Tillie were of exceptionally high standards, rivaling the aircraft maintenance procedures.—*USS* SARATOGA

Tempo vs Maintenance

A recent Weekly Accident Summary brought to light the problem of tempo of operations versus safe maintenance. A number of facets of this problem were examined by the committee. They were:

Better utilization of maintenance personnel in port. Take advantage of time for major checks and repairs. Spare maintenance personnel from tour guide duty, head cleaning . . . so that their primary job may be accomplished.

The fallacy of the need to report an explanation any time availability drops below 70% during periods of high operational tempo.

The constant request by squadron commanders for more and more flight hours may be possible in instances of quality control breakdowns. The committee agreed that it is better by far to have fewer flight hours in safe aircraft than more flight hours in aircraft that are substandard.

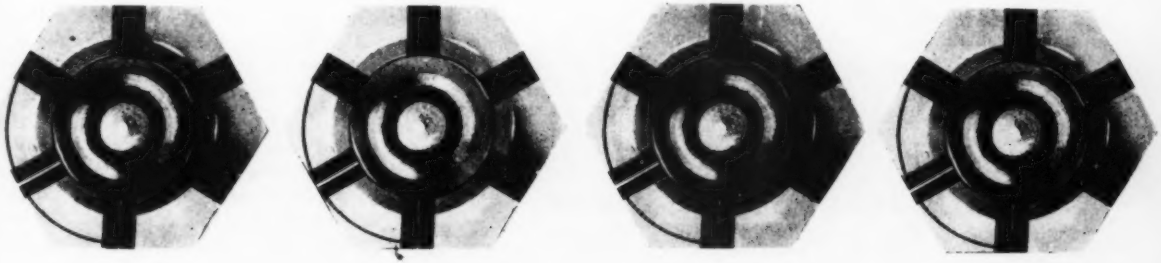
The committee discussed in detail the maximum number of successive days of flight operations that could be conducted without aircraft and personnel becoming fatigued. The consensus was that three days of flight operations should be followed by the fourth day devoted entirely to maintenance. This plan is proposed for safety only and, of course would not apply in the event of an emergency.—*USS* SARATOGA

Flight Deck Safety Films

The Maintenance Officer reported that on four consecutive nights before getting underway, flight deck safety films were shown to the crew before the beginning of the regular evening movie.—*USS Wasp*

Safety Instructions

During inspections it has been noted that the units have sufficient safety instructions but there is some doubt as to whether these instructions were issued for administrative inspections or to prevent accidents. For example, there are instructions written prohibiting personnel from riding on tractors as passengers except in seats provided for that purpose. Yet personnel continue to ride on the fenders of tractors. This indicates no follow-up on instructions. The commanding officer, as well as the safety officer, must conduct frequent inspections of the squadron areas.—*Aviation Safety Council Northern.*



CV STORIES

truth and consequences

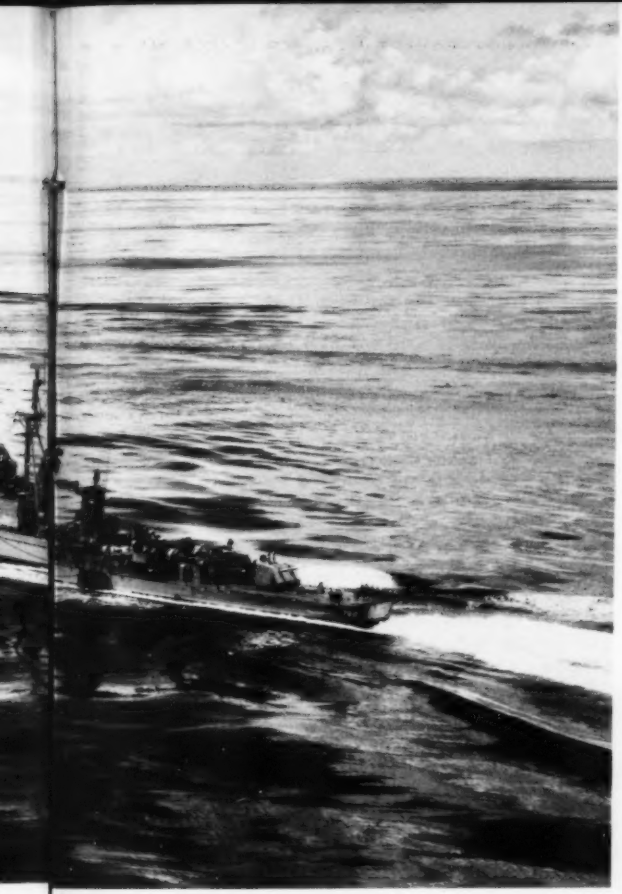
A REVIEW OF SIGNIFICANT AIRCRAFT ACCIDENTS

Plane	Inj	Dam	Cost	Mnvr	Time in Mod	CV Ldgs
F8U-1	None	C	$27,500	Hit ramp	409	204

From Pilot's Statement: ". . . When the LSO called for line-up correction the meatball was in a centered position but in retrospect I believe I took my eyes from the mirror when I tried to correct for the starboard cross wind.

"I feel that the aircraft was in a satisfactory flight regime until I applied line-up correction. At no time prior to the LSO's call for power did I feel that the pass was unsatisfactory and that a waveoff was in order. Had I taken a waveoff rather than attempted to line up, the accident would not have occurred. . . ."

From AAR Board: ". . . Of particular concern is the rapidity with which the approach deteriorated. The LSO seemingly had no forewarning that a dangerous situation was imminent. Suddenly, everything turned to worms. It is the opinion of the Board that the critical point in this approach occurred the moment the line-up correction was ini-



tiated. The airplane was very nearly close-in. Dropping the wing to effect the line-up correction precipitated easing the nose over. The conditions were thereby set up for a late waveoff. If there is any one lesson to be gained from this accident it is repetition of the adage that late line-up corrections should not be made. A waveoff is always in order. This is particularly true when there is little surface wind and the ship is making most of the wind over-the-deck. Under these conditions, precise airspeed control is a must. The glide slope is at its steepest and settling conditions the hardest to correct. Any last minute deceleration or stack gas turbulence can be sufficient to set the stage for a late waveoff. Coincidentally, the airplane is in a flight regime where response to power and attitude corrections is sluggish, at best. The waveoff may not be successful. . . ."

From an Endorsement: ". . . Particular note is made of the need for early recognition of a poor approach and in such case taking a timely waveoff rather than attempting a late waveoff or line-up correction close in. Equally stressed are the dire consequences of stopping a scan when close in; for example, concentrating on the meatball to the exclusion of line-up. Proper waveoff technique is also continually reviewed emphasizing the dangers of overrotating and thus establishing excessive sink speed when the approach is slow or making an inflight arrestment if the approach is fast. . . ."

Plane	Inj	Dam	Cost	Mnvr	Time in Mod	CV Ldgs
F4D-1	E	C	$16,341	In-flight engagement	449	220

From Pilot's Statement: ". . . On receiving the waveoff, I applied military power immediately. Realizing that I was very close to the deck I tried not to rotate the aircraft but believe I did pull the nose up a bit. . . . I believe this accident could have been prevented if I had been given the waveoff earlier."

From AAR Board: ". . . The deck was foul throughout the approach. The LSO spotter was aware of the foul deck and was holding a red flag at the time of the accident. . . . The controlling LSO was so engrossed in the talk-down that he was oblivious to the deck condition and allowed the aircraft to continue beyond a safe waveoff position. . . . It is considered that the failure of the controlling LSO to monitor the deck condition during the approach with the consequent late waveoff is the primary cause factor in the accident."

From an Endorsement: ". . . There is a point in each approach beyond which the safe execution of a waveoff is doubtful. This is true on a mirror as well as a no-mirror approach. The LSO should have this point in mind and never allow an aircraft to continue unless he is positive the deck is clear. . . ."

Plane	Inj	Dam	Cost	Mnvr	Time in Mod	CV Ldgs
A4D-2	E	B	$75,000	Hit ramp (Night)	327	207

From Pilot's Statement: ". . . About halfway down the glide slope my forward vision was again restricted due to rain. This was a surprise for it had not been encountered this close in on the first pass. *When the water cleared off, I could see no 'meatball.'* Paddles then came on the air, but was unreadable due to background noise. I applied full throttle while he was transmitting. The main gear hit the rounddown. . . . This accident probably could have been prevented had I initiated a waveoff when my forward vision became restricted."

Continued

From AAR Board: ". . . The board considers that the pilot erred in continuing his approach while close in to the ship in conditions which prohibited him from being able to maintain positive location of the meatball. At any time in an approach when a pilot does not have or loses a meatball he should immediately so inform the LSO. When this happens close in the pilot should initiate a waveoff. . . ."

From an Endorsement: ". . . To prevent accidents of this type in the future, all pilots of this command have been impressed with the necessity, particularly during periods of darkness, of ensuring that good communications exist with the LSO and that the LSO is informed any time the meatball is lost in an approach. In addition, pilots are constantly reminded never to accept a 'low' meatball when close in and that 'no' meatball close in is a mandatory waveoff unless the pilot is positive that the meatball went out the top as a result of a pitching deck."

Plane	Inj	Dam	Cost	Mnvr	Time in Mod	CV Ldgs
F8U-1	D	A	$1,083,000	Hit ramp Ejection	322	252

From Pilot's Statement: ". . . As I entered the glide slope I noticed excessive sun glare on the mirror and did not see the meatball. I so advised the LSO by stating: 'Negative Meatball.' . . .

"Even though this was my first ejection, first parachute descent and first use of the floatation gear, the frequent training lectures and demonstrations I have received made the whole procedure seem to be something I had experienced before.

"As for the accident itself, I feel that I disregarded one of my basic statements regarding carrier landings. I have frequently stated that whenever it is difficult to see the meatball due to sun glare on the mirror and the LSO states your approach is progressing normally, continue the approach but only to a certain point. At this point you must have sufficient glide slope remaining so that with acquisition of the meatball you have ample opportunity to incorporate the meatball into your scan (speed, line-up and meatball) and make necessary corrections. If the meatball is not acquired by the time this point has been reached, a waveoff is required. I believe that although I picked up the meatball, I was in too close to detect any tendency or trend of the meatball. There will be times, of course, when the pilot must rely solely on LSO meatball information. Such instances would occur with source light failure or extreme sun glare wherein even a slight change in the Foxtrot Corpen could not lessen the amount of glare. . . ."

From the AAR Board: ". . . The original circumstance which led to the accident was the sun glare on the mirror which also obscured the meatball. This not only denied the usual glide slope information to the pilot, but disrupted his scan pattern. In concentrating on locating and reading the meatball through the sun glare, the pilot gave less attention to refinements of speed, altitude, power and line-up. This resulted in his being unaware that the nose attitude was increasing along with and offsetting the effect of the power increases. . . ."

From an Endorsement: ". . . On every mirror carrier approach a continuing scan pattern of airspeed or angle of attack and meatball is *mandatory.* At no time should a pilot devote his entire attention to one item such as locating the meatball when the mirror is affected by sun glare. In this case the LSO was assisting the pilot as to his location on the glide slope thereby permitting the pilot to devote sufficient attention to line-up and airspeed. . . . It is standard operating procedure in this Air Group that in the event of a close-in waveoff there should be little or no change in aircraft attitude and that a touchdown is more acceptable and safer than an ineffective or unsuccessful waveoff. . . . The acceptance of a low meatball close-in under any deck conditions is an invitation to disaster. It is standard procedure for pilots to initiate their own waveoff under such circumstances and not try to outguess the deck. If the latter were attempted, it is doubtful that close surveillance of the meatball was maintained. . . ."

Plane	Inj	Dam	Cost	Mnvr	Time in Mod	CV Ldgs.
F4D-1	E	C	$9,870	Hard Landing	321	56

From Pilot's Statement: ". . . On the downwind leg I heard pilots calling 'no ball.' I entered the groove at 600' approximately 1-1¼ miles and called 'no ball.' The LSO informed me I was high so I took a high dip. Still no meatball. Again the LSO informed me I was high and another high dip was executed—but still no meatball. . . . At this time I felt I was in the proper position to have a ball and started eyeing a point just forward of the mirror to use as a visual reference for a point of touchdown. Again the LSO said 'You're a little high.' After taking my third high dip I said to myself 'take your bolter like a man and don't push the nose over.' (Up to this point my A/A had given me no indication of being fast. I either had an on speed indication or one for being slow. . . . Pitch

trimmers were set at 4 units nose up.) As I approached the ramp I felt the aircraft settling and started coming on with some power. . . . Upon touchdown the starboard gear collapsed. . . ."

From the AAR Board: ". . . No definite dive for the deck was seen but after passing over the ramp in such a position to lead the LSO to believe a bolter was evident, the aircraft began a sink rate greater than normal and engaged no. 4 wire. The excessive sink rate involved in this landing exceeded the design limitations of the landing gear causing the damage to the starboard main landing gear. Therefore the board concurs in assessing pilot technique as a cause factor in this accident. The malfunction of the mirror presented a handicap to the pilot during his approach and was a contributing factor. . . ."

From an Endorsement: ". . . With the advent of the angle deck both LSOs and pilots have tended to become complacent about high approaches. A slightly high approach is not dangerous if the pilot will 'hold what he has,' altitude *and* power, and accept a late wire or a bolter. Even though there is a natural desire to get every aircraft aboard the first pass, the LSOs must wave off aircraft that are not at the proper approach speed and altitude when approaching the ramp. . . ."

Plane	Inj	Dam	Cost	Mnvr	Time in Mod	CV Ldgs
A3D-2	None	C	$19,600	In-flight engagement Hard Landing	276	138

From Pilot's Statement: ". . . I lost the meatball at twelve o'clock just after crossing the ramp. . . ."

From AAR Board: ". . . The Accident Board felt that the pilot in an endeavor to 'get the job done,' tried to salvage a slightly high final approach in order to avert a possible bolter. . . ."

From an Endorsement: ". . . Pilots have been instructed to initiate their own waveoff when the meatball goes high and out the top of the mirror prior to reaching the ramp. Additional emphasis has been placed on the folly of attempting to salvage a bad approach in close. A safe bolter will never be severely criticized, but a 'dive for the deck' or 'easing gun in the groove' is an invitation to an accident."

CARRIER NOTES

Landing Interval

The landing interval was discussed. It was pointed out that a lot of time was being lost by foul deck wave-offs as a result of the recent decision to try to close up the landing interval. It was further pointed out that as another result of this decision the LSO's were giving later wave-offs than in the past. This allowed for the increased possibility of an in-flight engagement of an arresting wire with a resultant hard landing or possible accident. —*USS* SARATOGA

Helo Operations and Honors

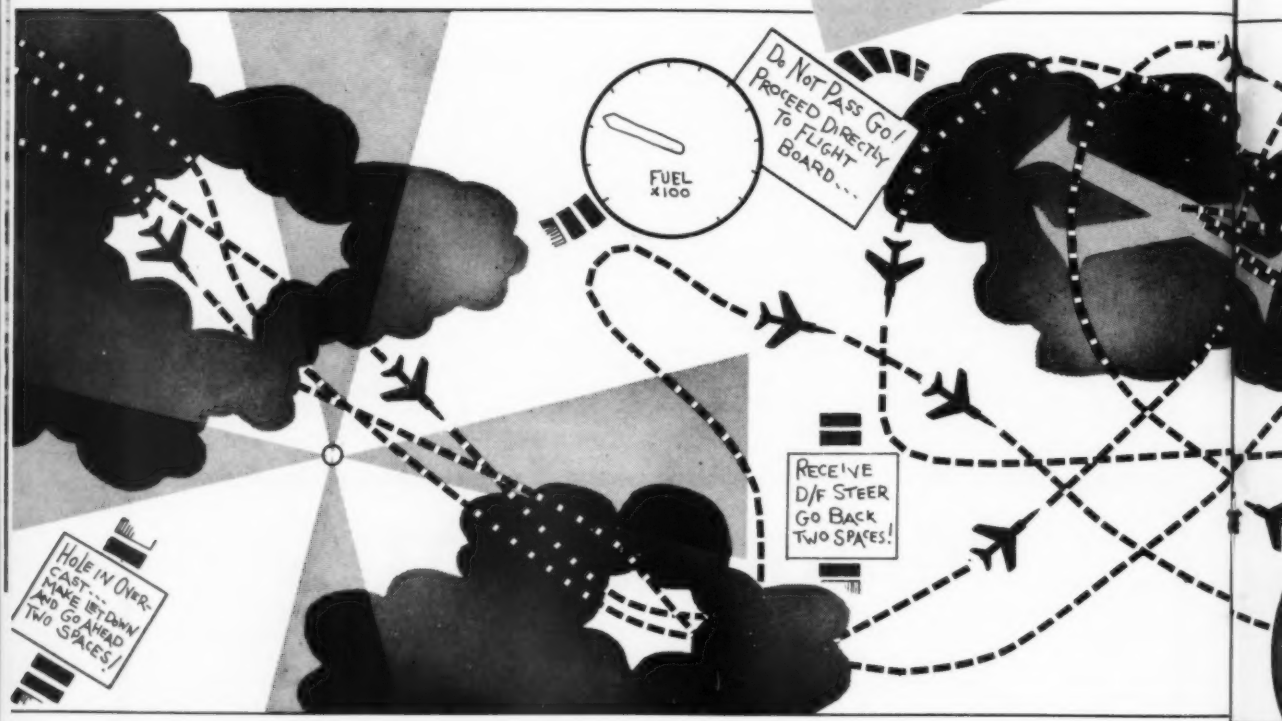
It was noted that flight deck personnel have become lax around the helicopters during the turn-ups, lifting and landings. It was also brought out that quarters and honors have been held during helo operations endangering numerous personnel unnecessarily if a mishap should occur.

Recommendations:

1. That the program to indoctrinate personnel of the inherent dangers involved with helo operations be continued.
2. That quarters or helo operations not be held in conjunction with one another.
3. Review the arriving and departing honors procedure involving helos to eliminate the dangers to side boys and other personnel—*USS* FRANKLIN D. ROOSEVELT

STLOST

Anymouse


FUEL
X100
DO NOT PASS GO! PROCEED DIRECTLY TO FLIGHT BOARD...
RECEIVE D/F STEER GO BACK TWO SPACES!
HOLE IN OVER-CAST... MAKE LET-DOWN AND GO AHEAD TWO SPACES!

From the first solo to the completion of the last flight after 30 years of flying, the aviator exposes himself to the possibility of getting lost or disoriented. This possibility decreases as experience increases, but is never completely gone. Here is a story of three soon-to-be naval aviators who picked up some experience via the "damp armpit" route.

Three tired but happy young students broke off an air-to-air hassle when they heard their instructor say, "OK, let's break off and go home." Up to now the flight had gone exactly as planned, with the students trying to show their instructor that potential enemy pilots were very shortly going to meet their match. For this was their last flight in the Training Command and tomorrow they would be designated aviators. But, things began to go wrong.

This Anymouse was flying no. 2 in the flight and his mike cord had become unplugged in the course of the hassle. I looked down, plugged up again, and glanced up to see the other three aircraft in the process of joining up. I slid in behind the leader in the "loose cruise position" and noticed no. 3 leading, or what I thought was no. 3. We approached the low overcast and popped into one of the few holes.

Once underneath, the Leader called me and asked if I still had the formation in sight. "Affirmative," came the reply. Whereupon no. 3 informed that he was missing the Leader but still saw 2 and 4: but no. 3 was the only one I couldn't see. "Something is amiss," I thought. No. 3 was the man I thought I had been following but no. 1 had popped through the hole by himself. "Fine thing," I thought,

LOSTLOSTLOS

"getting separated from your leader on your last hop."

I might add that we had earlier discovered on the hop that home field Tacan was inoperative and I might also mention that unnoticed by me, my RMI was indicating 110-degrees off. We contacted the Leader, who asked our position and he received the reply —"We are on the 320 degree radial of Podon-Tacan, the nearest field to home." "Fine," he answered, "enter the field on your own."

We rogered and took up a heading off Podon-Tacan which should have put us close to home. But not until a few minutes later did no. 3 point out that I was heading in the wrong direction, he thought, and he said to turn starboard to 360 degrees. "Starboard," I thought, "360 is 15 degrees to the left of my nose. One of us is a rather poor navigator." A quick glance at my wet compass showed me which one, and a longer glance, by this time, at my fuel quantity showed that this was a poor time for us to be blundering around under an overcast, unsure of our position in space.

The voices of 3 and 4 began to get a little excited in my earphones. I explained my faulty RMI apologetically and 3 assumed the lead, driving us in the general direction of home. No. 4 was scanning the murky landscape for a familiar landmark while I switched to tower frequency and started calling for a DF steer. No answer—samo-samo on approach control, and I even gave departure control a try. "Fine time for those silly blockheads to take a coffee break," I muttered, casting nervous glances at my fuel quantity and fuel flow. Things were beginning to get very excited now.

Our instructor was calmly telling us to get a DF steer. We were telling him that we had no contact. No. 3 was suggesting we try a guard channel and no. 4, with a shaky voice, was reporting that he had 600 pounds of fuel remaining.

What to do? I am forced to report that by now we were not exactly filling the description of clear-eyed young jet pilots.

We were under a hazy dark cloud, at 2000 feet, boring holes in the sky—towards?—we knew not where. Little farms swept

past our wings and oil rigs swept by, but no 9000-foot paved runway. Fifteen minutes of this and the fog proved to be denser. Into our three cockpits, we then heard the voice of an angel, "Pinball FOUR, this is Home Field Tower. We understand you are low state and need a steer. Over." "Ro-ro-roger, tower, I am indicating 450 pounds. Over."

After establishing that all three of the lost chicks were still blundering around together, tower began giving steers. Very shortly thereafter, we picked up the field at about three miles. Three sets of speed brakes came down, three planes stood on their wings, banked course to field, dropped gear and flaps, entered the pattern at a high 45 degree position and plunked on the runway as, with a great sigh of relief, we heard no. 4 rolling out ahead of me, calling, "Tower." (I'll never forget the sound of his voice.) "Tower, you'll have to send somebody out to pick me up. I just ran out."

Most nearly designated aviators agree that it's been a long and hard pull, but that now, we've really got it made. Three of the *newest aviators* now realize that it isn't over until the last plane is on the deck, and that *those wings of gold don't mean that you have anything made.*

We could easily have had three parachutes swinging gently in the breeze, and three heaps of wreckage scattered throughout the area!

This hairy tale should give all of our outfits cause for sober reflection and careful consideration of the question, "Could it happen here?"

It could *if:*

- Pilots insist upon waiting until the last minute to call for outside help if lost.
- Pilots don't *really* understand the operation and use of cockpit navigational equipment.

How about a little "soul searching" in *your* squadron?

INSTRUMENT

QUIZ

The following questions are ones that can crop up at inopportune moments. Seek out the answers you don't know.

1. You arrive over the clearance limit (enroute or terminal) and fail to receive clearance beyond that point or any holding instructions. Where and how should you hold? (Assume your radio is operating.)

2. If holding is necessary at the radio facility serving the destination airport and no holding instructions have been received, where would you hold if you were flying a reciprocating aircraft? (Assume your radio is not operating.)

3. If you encountered the conditions covered in question number two but were flying a jet aircraft, would the procedure be the same?

4. You are flying a jet aircraft at flight level 350 and you arrive at a destination which has a published jet penetration procedure but you have lost your command radio, where do you accomplish the descent to initial penetration altitude?

5. While on leave, you desire to make a flight. Can you occupy a crew position and log flying time? Under what circumstances?

6. What are the requirements for a rated pilot to log copilot time in a dual-control jet fighter or trainer?

7. What type of clearance is required for a flight on airways in the ZI between 10,000 and 20,000 feet flight altitude?

8. Enroute on a night cross-country, all stations crossed are reporting VFR conditions but you are on an IFR clearance. When may you cancel your IFR?

9. What are the takeoff minimums for a T-28 if the pilot possesses a white card? a green card?

10. Arriving over the destination fix, you are started down on a radar vector type of approach. If your UHF radio fails during this approach, what must you do?

11. On an IFR Flight Plan you discover your ARC-5 is inoperative, although all other gear is functioning. Are you required to report this? To whom?

Where to find the answers:—

1. ARTC Procedures (FLIP) paragraph D (4)

2. & 3. ARTC Procedures (FLIP) paragraph K (1)

4. ARTC Procedures (FLIP) paragraph K (4)

5. thru 10. OpNavInst 3710.7A Sect VI para 6 & Current OpNav Instructions.

11. Hydro Washington, D.C. MSG 162146Z of 17 Feb 1961.

PARACHUTES IN HELICOPTERS?

by 1stLT JOACHIM A. CROGNALE, SEVENTH ARMY AVIATION CO.

The standard answer to why wear parachutes in helicopters is that you would not have time to bail out anyway. The recent emphasis on helicopter instrument flying has caused this statement to be echoed many times by old and new helicopter pilots alike. The feeling is that if an actual in-flight emergency did arise there would not be sufficient time to abandon the helicopter. As an instructor at the Seventh Army Helicopter Instrument School, I am required to wear a parachute on all instrument training flights. I had pretty much the same feeling toward the wearing of the parachute until, if you'll pardon the expression, "I learned about flying from that."

It was the usual winter morning at Stuttgart, Germany, existing weather 0.4 visibility with ground fog. The only available alternate being the old standby, Hahn Air Force Base. My student and I received a weather briefing for a 2-hour local IFR flight. We were briefed on the existing weather and received a forecast for our ETA to be 500 and 1.

We pulled pitch at 0730A; it was a routine training flight and at 0900A we were cleared to hold over Herrenberg at 4000 with an expected transition time of 0940A. The fog bank topped off at 3300 (2000 absolute). As we approached Herrenberg, the oil pressure gage began fluctuating and a noticeable drop in the oil pressure was observed. It is quite a sensation to look down for a place to go, and see nothing but the top of a fog bank. Stuttgart approach was notified of the situation and they asked if we wanted to declare an emergency. We were about to give them an affirmative when a hole was spotted 10 miles to the northwest. We elected to attempt a landing. The helicopter was landed safely in a field in the middle of the Black Forest. The ship was checked and found to be completely out of oil. It was later determined that an engine change would be necessary prior to flying the ship out.

All of this leads up to one question: Suppose that the hole had not been there, what would have been the course of action? Two possibilities were open: (1) Autorotate with a possible zero-zero ground condition, or (2) bail out. It was estimated that we had another 10 minutes flying time before the engine would have ceased. We would have had time to abandon the ship if necessary. An autorotation would have been possible if there had been a definite ceiling with the probability of breaking out at 300 to 400 feet above the ground. With a zero-zero ground condition, and I am sure you will agree, a silk approach would be more feasible. A point to remember here is that the statement often given in weather briefings, "Hill tops are obscured" could, depending on the terrain, indicate a zero-zero ground condition. Incidently, after the above landing the hole closed up and ground visibility was estimated to be 0.2 mile.

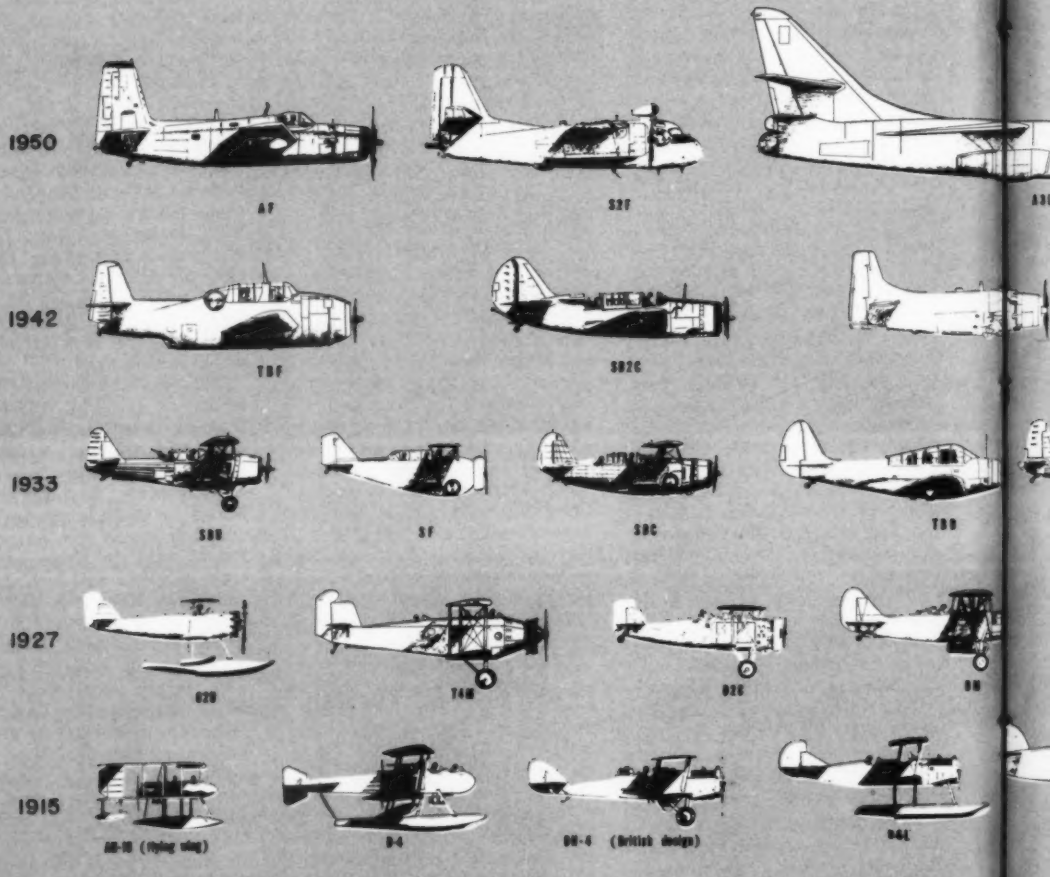
How would you abandon a helicopter in this or a similar type emergency? The passengers, crew chief, and copilot would have no difficulties; they could exit through the cargo door (H-34). How about the last man to leave, the one left hanging on to the cyclic? After much hangar talk around the coffee cup it has been decided that the best solution would be for the pilot or instructor pilot to put the stick trim on and trim for a descending turn opposite the direction toward which he is jumping. The consensus is that by diving out and down he would avoid striking the ship. This possible solution pertains to the H-34 only and to the best of my knowledge has yet to be tried.

I believe that an improvement could be made in the type of parachute being utilized. Presently we are using the standard back pack. A large man would have difficulty bailing out the window without completely upsetting the helicopter. In lieu of the back pack, why not utilize the chest pack? Each man involved with helicopter instrument flying could eliminate the bothersome and time consuming task of fitting the parachute every time a new ship is flown. This, being very frank, is one of the main factors that discourages the use of parachutes. The chest pack would not be as uncomfortable to fly with and would not be such an obstacle when bailing out.

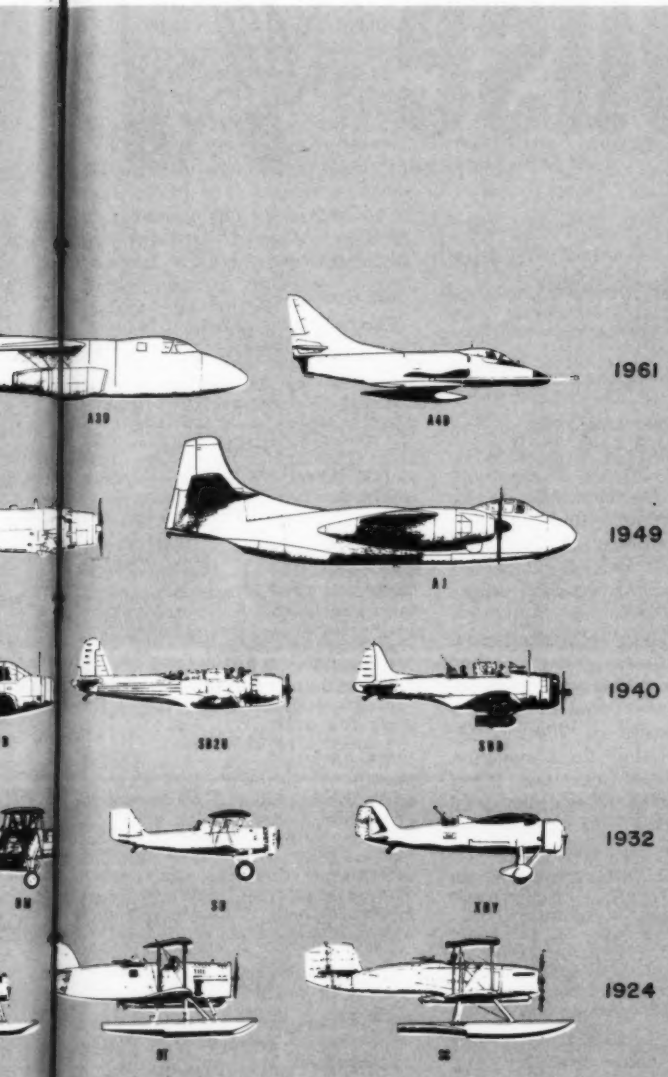
This incident is one of a multitude of in-flight emergencies that could occur, but it surely disproved the old wives' tale that parachutes are impractical in helicopters. Actually there is hardly an in-flight emergency in which it would not be possible for at least the passengers and crew chief to bail out. If only one life is saved it is well worth the effort of wearing the parachute, especially if it is your life.

► *As instrument capability and frequency of instrument flight in helicopters increases there is an increasing need for reliable information on bailout procedures. There are many vital questions that need to be answered such as feasibility of bailout during autorotation, minimum bailout altitude and best type of parachute. There is presently very little reliable information on the subject. The Naval Aviation Safety Center has recommended that a helicopter bailout project be established to furnish answers to the many unanswered questions.—Ed.*

DEVELOPMENT OF U.S. A



S. NAVY ATTACK AIRCRAFT



The "Attack" designation is relatively new in Naval Aviation, coming into use shortly after World War II, therefore most of the airplanes shown here represent merely an "attack" capability in the broad sense.

Prior to World War I, the major mission of Navy aircraft was unarmed observation but the need for armament was recognized; bombing tests were made with the AH-10 type and the *Galludet* D4 had anti-sub bomb racks installed. In January 1917 a machine gun (in a flexible mount) was fired from the AH-10 with "no ill effects observed." A few months later the war brought an urgent need for aircraft capable of attack missions and Navy pilots ended up flying European designs.

In the 1920's several mission classifications appeared and became the true root of the modern Attack designation: Scout, Torpedo, and Observation (VO class planes of the late 20's and early 30's often doubled as dive bombers). The monoplane XBY-1 was unique in an age of biplanes and though its design and performance were intriguing, it never went beyond the test stage.

An increase in power and performance of single-engine aircraft was the story in the 30's and 40's. Then the AJ-1 split the operational aspect into heavy and light attack.

It was felt appropriate to include the S2F and AF in this chart. Even though confined to anti-sub duty, the AF carries an attack designation: the *Stoof* continues the old VS class tradition.

Have a problem, or a question?

Send it to

headmouse

he'll do his best to help.

Carrying Water Bottles

Dear Headmouse,

The pilots of my reserve FJ-3 squadron were briefed on desert survival prior to deploying last year for active duty training at Yuma. Standard pistol belts and canteens were made available for those who wished to carry a supply of water in the event of an ejection over the desert. It is my opinion that this is a poor idea because of the injury potential presented in a parachute landing when the canteen is worn on the hip.

My solution to the problem was the use of an ordinary hot water bottle. The bottle is slung on a loop of thin nylon cord and carried under the left armpit inside the flight suit. The pilot's left arm is inserted through the loop which is then passed over the head so that the cord lies on the right side of the neck. It presents no strangulation potential because the bottle does not move about after the flight suit is zipped shut. The parachute straps pass just above and below the bottle and serve to hold it stationary. There is no problem of expansion at altitude if all air is removed when inserting the plug. I feel certain that the bottle will easily withstand the loads imposed in a rough parachute landing and might serve to some extent as a cushion. It does not interfere in any way with the pilot's movements in the cockpit and is not at all uncomfortable to wear. The bottle I use holds 50 fluid ounces as opposed to the 36 fluid ounce capacity of the issue canteen.

I realize that there are some shortcomings in the proposal. It is not adaptable to the integrated harness used in A4D, F8U and several other aircraft. It is likely that purchase by the individual will be required. To my knowledge it has not been tested in an ejection and parachute landing but El Centro could work this in as an added item on a test with little difficulty.

I hope that other pilots will try this idea as it promises an easy solution to a critical survival problem.

PHILIP F. OESTRICHER, CAPT, USMCR

► A hot water bottle has several things to offer over a canteen; however, neither of these could be considered acceptable for use with an ejection seat. There is no question that a standard canteen on a web belt would be lost during ejection. The hot water bottle worn under the flight suit will not be lost due to windblast. However, if we assume a hot water bottle to weigh one pound, then we must realize that a force in excess of 100 pounds will be exerted on the suspension line at time of ejection. What the effect of a thin nylon cord across the right shoulder will be when subjected to a 100-pound pull would be pure conjecture on our part. The effect of this force on the grommet to which the line is attached is also unknown. It would appear that adoption of this device without the usual extensive tests by the Air Crew Equipment Laboratory, the Naval Parachute Facility and final approval by the Chief, Bureau of Naval Weapons should be discouraged.

Very resp'y,

Headmouse

Securing the P2V Engine

Dear Headmouse,

The P2V-7 Flight Manual Emergency Procedures section cites conflicting information regarding procedure to be employed for feathering an engine. In one paragraph it states "Mixture—Idle cut-off" and in another, "Mixture—full aft." This conflict has given rise to two different schools of thought in the feathering of engines.

1. Use the "E" lever for all feathering—"Full aft"
2. Use the "E" lever "Full aft" only for feathering of an extremely hazardous type of emergency, e.g., failure on takeoff, fire, etc. All other feathering to be accomplished by:
   a. Throttle—Retard
   b. Mixture—Idle cut-off
   c. Feather—Depress button
   d. After engine is stopped—"E" lever full aft
   e. Secure by checklist.

The latter procedure is supported mostly by the "old" P2V drivers and has been adopted by our Standardization Board. In an effort to slow down the dissention it is requested that you forward or print information regarding any unsatisfactory conditions resulting from either method of feathering and any recommendation you may have.

LT A. G. ALEXANDER
Flight Officer VP-2

► Headmouse supports your "old" P2V drivers but gladly furnishes some reasons. The reasoning is generally based on the fear of securing the wrong engine. There are sufficient cases on record to warrant that fear. So, let us approach the problem analytically.

There are only three reasons for securing an engine that I can think of:

1. at the end of the flight
2. for practicing emergencies and
3. in case of engine malfunction.

The first reason can be ignored for our purposes but the second and third reasons are of concern to the problem you presented.

When an engine malfunctions, there are two primary engine controls to use for the purpose of assuring the pilot that he is working with the correct engine: mixture control and throttle. Retarding the throttle accomplishes two things:

1. insures that you are working the desired engine without completely cutting it and
2. determines the possibility of operating the engine at a reduced power setting.

In case of malfunction in cruise, both mixtures should be moved to rich position first as suggested on page 3-2 of the Pilot's Flight Manual and then increase the power on the good engine. While doing so, you are insuring that you will be working to secure the desired engine if you have to go that far.

In the second procedure you mention in your letter, it is suggested you place one additional item between c and d: "Check for fire." The surest and quickest way to extinguish an engine fire is to deny it a source of combustion, so this is the time to place the "E" lever FULL AFT. The latter case comes under the heading of an extremely hazardous type of emergency. If the fire is detected before or simultaneously with other engine malfunction, use the "E" lever to feather and shut off the fluids. In this case it seems most convenient to have feathering and the fluid shutoff accomplished by moving *one* lever but *be sure it is the correct lever.* Under most circumstances, with the jets working on takeoff, engine failure is not considered extremely hazardous but, again, it is most convenient to use one lever if the situation warrants it.

As for practicing emergencies, be sure you practice what you preach. Use the throttle first in most cases. Practice will help prevent an actual case of securing the wrong engine.

In summary: *"Do not hurry but move promptly and skillfully."*

Very resp'y,

Headmouse

Suit-Ability

Dear Headmouse:

For some time now I've been puzzled as to why we are still saddled with our multi-zippered mechanics uniform which is laughingly called a Flight Suit. I have some ideas on the subject and hope that Headmouse can pass them on to the appropriate agency for evaluation.

The present orange flight suit could not have possibly been approved with a jet pilot in mind. A high proportion of Naval Aviators fly the A4D and the F8U. Both aircraft require a torso harness and as you well know, all good jet pilots wear the anti-G-suit on the outside of the flight suit. Thus attired, our aviator has only one of the seven flight suit pockets available. The small one on the left shoulder. I find that even the anti-G-suit pockets are unusable and should be enlarged by incorporating an accordion pleat and utilizing a flap opening.

It occurs to me that the Navy is spending a considerable amount of money on zippers that are never opened. This excessive pocket area also adds to pilot discomfort in hot weather as the material is double thickness.

I would much rather wear regular Marine type dungarees that have been fire proofed. The cost is considerably lower, $13.90 for the flight suit vs $4.50 for a pair of dungarees. There is no reason why the dungarees could not be dyed orange for high visibility. I know for a fact that dungarees won't fall apart after one washing and they are just as comfortable as the flight suit.

R. M. COOKE, Capt, USMC
VMA-332

► Capt. Cooke's letter was forwarded to the Air Crew Equipment Laboratory of the Naval Air Material Center, Phila. Here's their comment:

The Navy's summer flight suit has been in military service for a number of years and has found application under a wide variety of flying conditions and aircraft.

This suit was designed to satisfy most of the needs of flying personnel operating the many models of naval aircraft. It was rather improbable that the suit would specifically meet requirements of a single application.

Instead, the intent was to attempt to fulfill as many of the general requirements as possible. As a result, it was found that by slight personal modifications of this general suit design, it was possible to further improve the adaptability of the suit.

However, if it is found that the comments of this letter represent the desires of a large enough group, it is probable that an effort will be made to design a suit specifically for this group. In the many evaluation studies covering the acceptability of the summer flying suit, none of these studies revealed the type of information contained in the above letter.

Perhaps this article will arouse sufficient interest on the part of readers to help determine the extent of need for this specific type suit.

Very resp'y,

Headmouse

Mail your questions to:

HEADMOUSE

U. S. Naval Aviation Safety Center

Norfolk 11, Virginia

YOURS for the

How well do you know the aircraft you are flying? Would an emergency become a catastrophe because of your lack of knowledge about your aircraft?

The Naval Aviation Safety Center has stacks of reports on accidents caused by pilot factor. Many of these accidents happened because the pilot just didn't know the information in his Flight Manual. Don't become a statistic! Get the word from your Flight Manual.

What You Read May Save Your Life!—You are flying the finest, most expensive aircraft in the world. Thousands upon thousands of engineering hours have gone into its design, testing and modification. This piece of machinery gives you the best weapon system the Navy has. Do you put your best into flying this aircraft?

These Are the Facts—In cooperation with the Bureau of Naval Weapons and the Naval Training Device Center, Courtney and Company, a private research organization, has been studying methods to improve the Flight Manual (formerly known as Pilot's Handbook and Flight Handbook). Their analysis of present usage reveals this major fact—a great number of naval aviators do not read the Flight Manual. Over 500 aviators from 28 different squadrons were surveyed, and statistics show Flight Manuals are not being properly used. Some representatives facts are:

Fact 1 Almost one-fourth of the pilots do not even have a Flight Manual for the aircraft they are flying.

Fact 2 Of those who do have one, 42 percent are either not sure it is up to date or are definitely sure it is not up to date.

Fact 3 In one case, there was only *one* current Flight Manual in an entire squadron.

Fact 4 Student aviators seldom use the Flight Manual for any purpose.

Fact 5 Most aviators do not understand the revision system for Flight Manuals. Of the pilots interviewed, less than 5 percent knew that the black vertical line on a page of text indicates revised or new material.

Fact 6 Aviators interviewed did not know the meaning of CAUTION and WARNING notes used in the Flight Manual.

Fact 7 No standard method of distributing Flight Manuals or revisions within the individual squadrons is used.

Obviously, if you who fly an

by LCDR L.C. Ellis, USNR

READING

extremely complex, modern aircraft do not have a current Flight Manual, or if you have it and do not read it, you are not approaching aviation in a professional manner.

Written by pilots for pilots—One thing you can be sure of: it is safe to rely on the Flight Manual. It is prepared and checked by commercial engineering test pilots and naval test pilots from the Naval Air Test Center, the most professional aviators in the flying business today.

As an aircraft is being developed, engineering notes are used for the first flights. As the test program develops, contractor test pilots feed information to technical writers who put this information in words any aviator understands. Throughout the contractor phase of the test program, the Flight Manual is constantly checked for accuracy and readability.

When the aircraft is accepted for BIS trials, every conceivable test is used to make sure that the Navy is getting a safe, reliable aircraft. These tests include a verification of the accuracy of the Flight Manual.

In addition to these checks made by the contractor and the Naval Air Test Center, the Flight Manual and all revisions are constantly checked by BuWeps engineering personnel. Any modification is at once incorporated in the Flight Manual. If such change is urgent, corrected information is forwarded by naval message or speedletter.

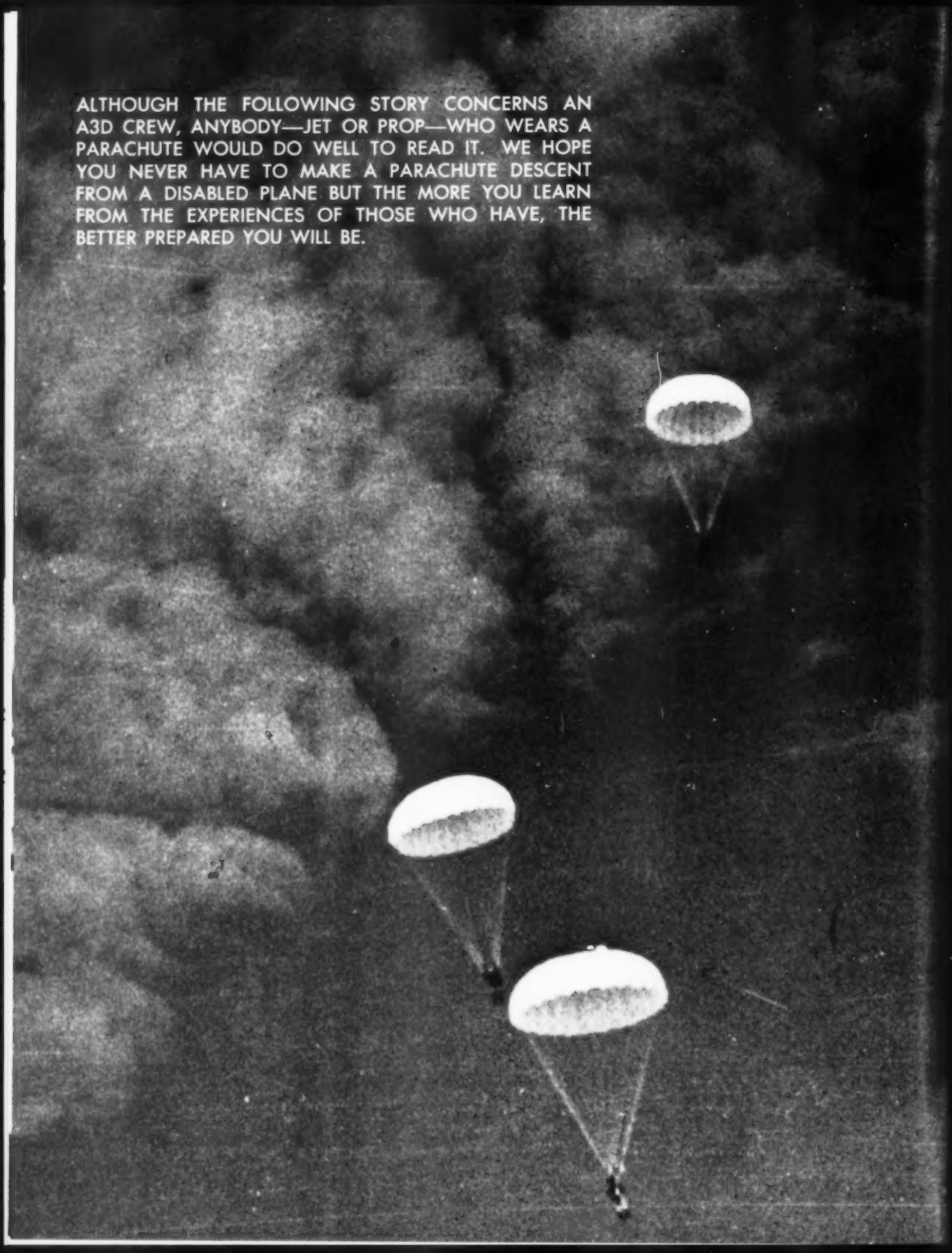
Throughout the production life of the aircraft, the Flight Manual is revised every 90 days to incorporate changes made to the aircraft. To inform all activities of the latest aircraft publications, the BuWeps 00-500 Publication Index is issued monthly.

It Ain't Simple—A major gripe about the Flight Manual is that it's too complicated, but so is the aircraft you are flying. When you went through flight training, you spent hours learning navigation, instruments, engines, gunnery, principles of flight, communications. . . . How many hours have you expended learning something about the Flight Manual?

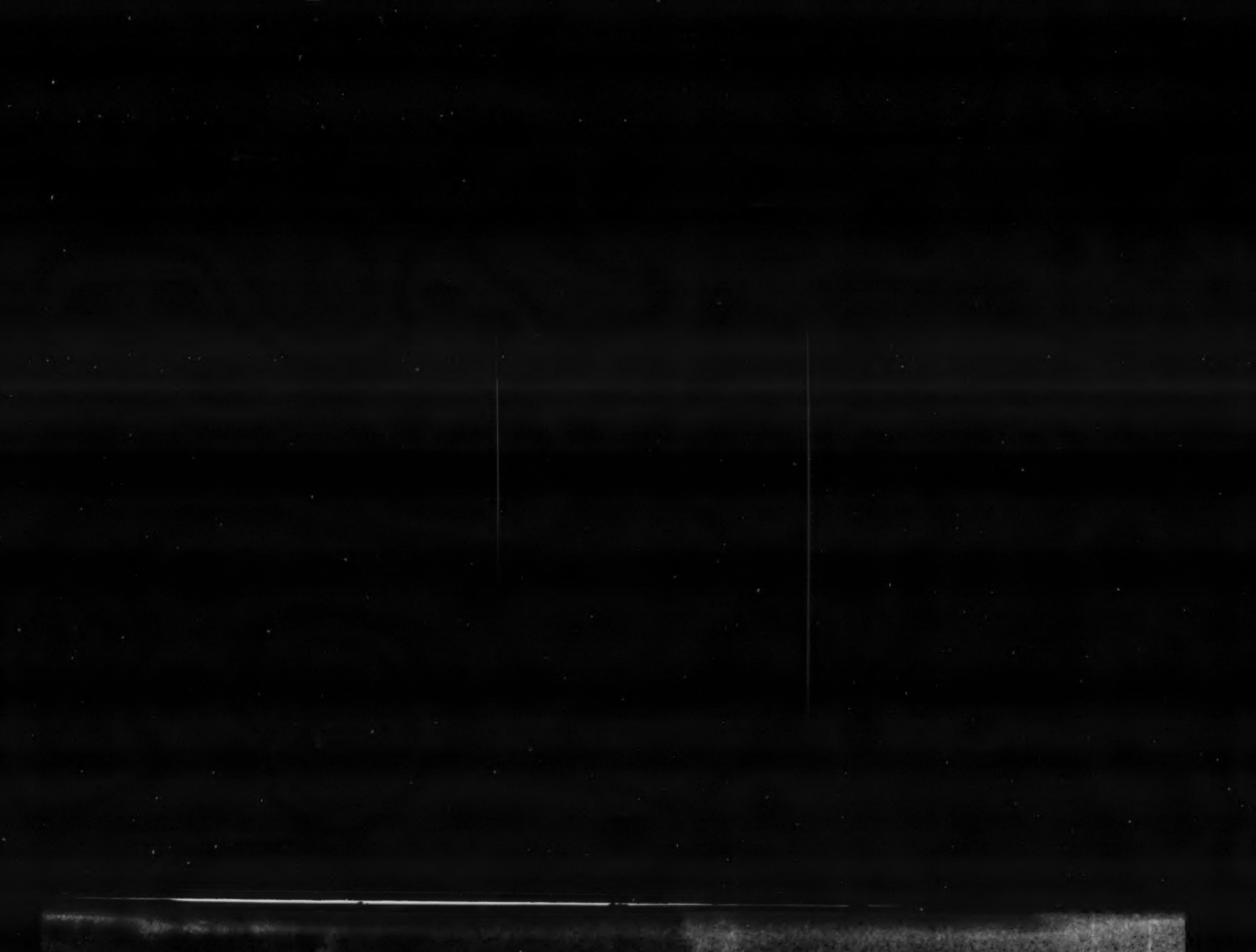
The Flight Manual, properly used, may someday save your life. It is the only official document that explains how to operate the aircraft. All the data you ever receive on the operation of your aircraft comes, either directly or indirectly, from the Flight Manual. The REST computer, for example, is based completely upon information from the Flight Manual. If you were among the large group of pilots who provided the facts, you are obtaining operating data from other sources. You are relying on someone else to dig the information out of the Flight Manual for you. Don't take the mess cook's word, when you can have the advice of experts.

Just Fill Out the Form—Flight Manuals are printed in sufficient quantity for every aviator to have one for the aircraft he is flying. Automatic distribution is established by completing NavWeps Form 2126. If you need a single copy without later revisions use NavWeps Form 140. If distribution problems are encountered, notify BuWeps promptly so that corrective action can be taken. This five minutes of paper work might well add years to your life.

This article was prepared by L. C. Ellis of the Engineering Branch of the Bureau of Naval Weapons, Code RREN-64. He is a naval aviator who has accumulated more than 2700 hours, has checked out in 15 different model aircraft and has flown as either pilot or copilot in 20 different models. He has been a naval aviator for 18 years and is now a LCDR in Naval Reserve Attack Squadron VA-662 flying AD-5 aircraft. As Head of the Technical Manuals Unit he is the project engineer on the Courtney and Co. study.



ALTHOUGH THE FOLLOWING STORY CONCERNS AN A3D CREW, ANYBODY—JET OR PROP—WHO WEARS A PARACHUTE WOULD DO WELL TO READ IT. WE HOPE YOU NEVER HAVE TO MAKE A PARACHUTE DESCENT FROM A DISABLED PLANE BUT THE MORE YOU LEARN FROM THE EXPERIENCES OF THOSE WHO HAVE, THE BETTER PREPARED YOU WILL BE.



"We are leaving the aircraft!"

AT approximately 1300 on a clear summer day in the Western Pacific, the A3D-2 was launched on a bogie mission to take part in an Anti-Air Warfare exercise. The crew was made up of pilot, bombardier-navigator, a gunner-navigator and plane captain. Preflight inspection and launch had been normal. Nothing eventful took place during the first 2¾ hours of flight except for intermittent ICS cut out.

At 1545 while the A3D and two other aircraft were effecting a rendezvous over the carrier at 15,000 feet, a loud whining sound was heard. This was followed by smoke coming from the companionway under the escape hatch. Aware of a recent fatal A3D accident resulting from a fire in the companionway area, the pilot declared an emergency. When the gunner-navigator was unable to open the escape hatch manually, the pilot ordered the bombardier-navigator to blow the escape hatch open with the emergency handle and the crew to bail out.

The gunner-navigator left the aircraft followed by the plane captain and the bombardier-navigator.

The pilot unstrapped from his seat but paused in the aisle of the cockpit where he could see into the companionway. He noted that the smoke seemed to be dissipating. Weighing the evidence, he concluded that the fire was out and subsequently brought the aircraft in for a safe landing aboard the carrier—possibly the first A3D carrier landing ever made without a crewmember.

The three crewmen parachuted to the water. Two of the men were picked up by a waiting helicopter and the third by a plane guard destroyer. Here are their accounts of parachute descent and rescue:

Gunner-Navigator: "The pilot said over the air *mayday, mayday, fire, fire, we are getting out.* The bombardier-navigator repeated it. While this was going on, I was making last minute adjustments to my harness and replacing my oxygen mask over my face. (I was riding in the fourth seat.) The bombardier-navigator pulled the red handle, releasing the escape chute.

"I slid or rather was sucked down the chute feet first on my back. The blast of the slipstream caused by the plane's forward motion was terrific. As my head cleared the plane, air rammed up the back of my APH-5 hard hat and jammed it up over my head and face. I would like to point out here that the nape strap on my helmet was exceptionally tight—tight to the point of causing pressure on the nape of my neck. Also, I would like to point out that the last thing I did in the aircraft was to push both Hardman fittings completely home. I feel that under no condition could I have had my APH-5 more secure on my head.

(*A chinstrap reinstalled per BACSEB 17-58A would have improved helmet retention.—Ed.*)

"As we had just disconnected the baro-lanyards from our parachutes, it was necessary to actuate the parachutes manually. At the time, it never occurred to me to delay more than a few seconds. I delayed what I thought was long enough and then reached across my chest with my right hand and pulled the D-ring. It took what I would estimate as about three seconds for the chute to blossom. I had no sensation of opening shock. If there was any, it must have been light because I distinctly remember the sound the chute made when it opened—just a 'Whap.' At this time I decided to get my helmet back on my head where it belonged and to get rid of my oxygen mask. I had the parachute D-ring in my right hand so I tried to adjust my helmet with my left. Finally I threw the ring away and used both hands to release the mask and readjust the helmet.

"I then tried to get into the seat of the chute.

Impossible. I made a fast guess as to how high I was and decided that the short distance I had to fall did not warrant the expenditure of so vast an amount of energy. In this squadron it is standard procedure for the man in the fourth seat to have a parachute without the raft installed. The raft is carried in a rack next to the seat. Upon leaving the plane I had decided against taking the raft with me as I didn't know how much strain this would place on my arms when the parachute opened.

"Outside of some minor discomfort due to hanging by the leg straps, the descent was uneventful. I watched the ships start to turn around and head toward us. I noticed many aircraft circling the area and knew I had it made after all if I just didn't make some shark mad after I got in the water. I let my mind dwell too long on the shark bit and was wishing I had brought the raft along. The next time I looked down I saw I was getting close to the water and was able to tell I was facing the wind which was what I had decided I wanted.

"When my feet made contact with the water, I was thrown rather violently on my back and was stunned momentarily. In a few seconds I regained enough presence of mind to release the chest strap of the harness and then the leg straps. I had no difficulty releasing the chest or left leg strap. I did have a little trouble with the right leg strap because I was wearing a pistol belt around my waist and it had turned and slipped down, partially covering the ejector snap. When I released the last strap I extended my hands over my head and the harness was pulled free by the chute.

"I was still on my back in the water. Inflation of the mae west was no problem. While descending I had noticed another crewmember and decided to see if I could find him and possibly share his raft —if he had one. This was unnecessary—when I turned to start in what I thought was his direction I was looking directly at the helicopter. The crewman lowered the rescue seat; I crawled on it and was hoisted aboard . . ."

Plane Captain: "The gunner-navigator was the first one to bail out and I went right behind him. If there was an initial shock when I left the plane I do not recall it. As I was descending I became sick and wanted to vomit. I could see the ship and two other crewmen in their parachutes. I made several attempts to adjust myself in the parachute but I could not do it. Just before hitting the water I unbuckled my chest strap and left leg strap.

"As my feet hit the water I fell away from the chute. The wind caught it and since my right leg was still fastened I was blown and dragged through the water. I pulled my mae west toggles just as I started to sink. I attempted to cut my right leg strap but my knife (my personal knife, not a standard survival knife) was too small to do the job. I finally worked the leg strap loose and freed myself. The water was not too choppy or cold.

"I could see several planes circling me. The TF dropped me a life raft. As I was swimming for it, I caught sight of a destroyer coming to pick me up. I changed my course and started swimming toward the ship. As the ship neared, they started to throw some lines to me. I was too weak to pull the lines so I wrapped them around my arm and started to make my way to the ship. While I was doing this two men from the ship jumped into the water to assist me in getting aboard . . ."

Bombardier-Navigator: "I first reached for the escape chute handle when the pilot said 'We are leaving the aircraft' but on looking aft I saw the gunner-navigator was working with his parachute harness so I delayed an instant. I switched the UHF to Guard and then reached back and pulled the escape chute handle. The escape chute blew open. As I got out of my seat to bail out I hesitated in the aisle because there were oxygen hoses and cords dangling in the escape chute. I pulled them out of the way, then put my mask hose under my left arm and placed my hand near my parachute manual D-ring because the baro-lanyards had been disconnected when we started our descent list. Then I jumped. There was a 'Whoosh' and the next thing I remember it was real quiet. I looked up and saw my parachute was partially open but badly torn. I thought 'Joe, it looks like you've bought the farm this time.' There seemed to be a lot of G-force on me because I was unable to get back into the parachute seat or get my raft out. I seemed to be spinning and I became very dizzy and nauseated. About this time I blacked out. When I came to, I was lying on the deck of the helicopter and saw the helicopter chief and our gunner-navigator . . ."

Observers stated that the bombardier-navigator, the last man to leave the aircraft, descended quite rapidly and was the first of the three men to hit the water.

Flight Surgeon's Comments: The reporting flight surgeon makes the following observations:

- Although he was dazed and rotating rapidly, the bombardier-navigator functioned efficiently during the parachute descent. This is felt to be the result of his survival training.
- The gunner-navigator did well in the survival phase except that 1) he did not take his pararaft with him when bailing out and 2) he removed his life vest in the helicopter.
- The plane captain was unable to release himself from the parachute harness rapidly.

None of the three men hooked his pararaft lanyard to his life vest.

Where am I?

Let's review our Emergency Locator Devices

LAST year, personnel in a maintenance facility at a naval air station inadvertently put a pilot's AN/PRT-3 emergency beacon in an operating status for an hour while installing it in a PK-2 pararaft kit. Did this error trigger a widespread SAR operation—search planes, helicopters, the works? Far from it! For one hour no one recognized that this Beep . . . Beep . . . Beep . . . at one-second intervals on guard channel, 243.0 mcs was an emergency distress signal.

► Pilots flying in the area who heard the signal on guard channel became annoyed with the tone and turned their UHF transceivers from T/R&G to the T/R position.

► The tower broadcast a request for the person transmitting on guard channel to identify himself.

► Although the beacon transmitted on the UHF guard channel and completely saturated the immediate area with a distinctive tone modulation for approximately one hour, no attempt was made to locate the source of the signal or to activate search and rescue facilities.

► At least eight pilots in the hangar area heard the transmission over squadron base radio before one of them recognized it.

It should go without saying but it looks as if we have to say it: Every pilot, tower operator,

and member of an SAR team must be able to instantly identify the signals broadcast by the Navy's emergency locator beacon, transmitters and transceivers.

Of course the ideal solution is a single standardized beacon signal. Planning for this is underway in the Navy Department at the direction of CNO. The new single signal will be in general agreement with the requirements of NATO Standardization Agreement STANAG 3281. Essentially it will consist of a variable frequency tone modulator with a sweep rate of approximately three cycles per second. This will present a distinctive audio emergency signal which will give accurate bearing indications on presently installed direction finding equipment.

The new signal will be incorporated in the specifications for future equipment of this type. Until fleet issue of equipment with a standard beacon signal, the Navy will continue to rely on its current equipment. More intensive orientation and recognition training in recognizing the sound of existing signals seems to be in order.

In the interest of familiarizing the fleet with the different emergency locator signals, the Naval Aviation Safety Center has recorded them on a tape with a brief discussion of each. Distribution includes major type commands, Naval Districts, naval air bases, Fleet Air Wings, carriers, Coast Guard Districts, and certain training activities.

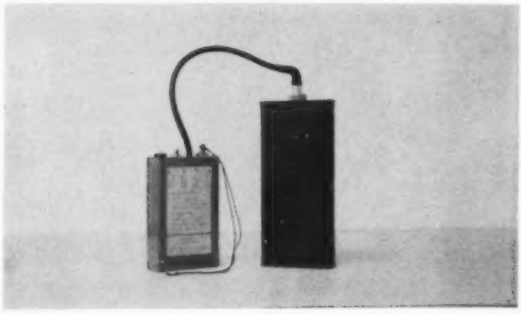
Equipment in Service

As of the present time, the following equipment is in service:

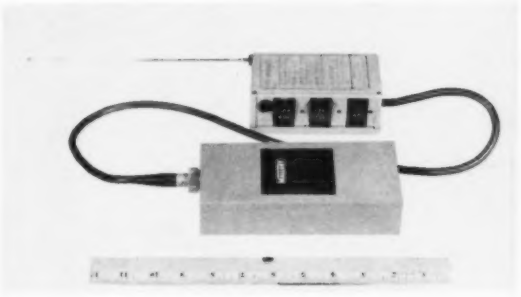
AN/PRC-17/17A. Personal, two-way voice radio plus beacon operating on 121.5 mc or 243.0 mc. Total weight including battery is 7.5 lbs. Not transistorized. Manual operation through switching arrangement with a 12-15 hour operating life. Steady audio tone on beacon mode. Compared with later equipment, the unit is large, heavy and low powered. Range of 10-20 miles with search aircraft at 5000 feet. Stowed in PK-2 pararaft kit.

AN/PRC-32. Personal, two-way voice radio plus beacon operating on 243.0 mc. Total weight including battery is 4 lbs. with battery in separate package. Not transistorized. Manual operation through switching arrangement with an 8 hour operating life. Steady audio tone on beacon mode. Range of 20-40 miles with search aircraft at 5 to 10,000 feet. Stowed in PK-2 pararaft kit. Replaces AN/PRC-17/17A. To be replaced by the AN/PRC-49 or AN/URC-39(XN-1) depending on which unit proves to be more satisfactory as a result of fleet evaluation.

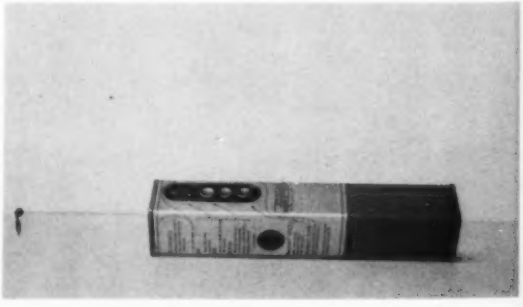
AN/PRT-3. Personal radio beacon operating on 243.0 mc. Total weight including battery is 3.5 lbs. with battery in separate package. Automatic beacon operation upon parachute deployment with a four-hour operating life. Beacon has pulsing audio tone for improved recognition and reception. Range is variable depending on antenna configuration and altitude during descent. 20-60 miles within line-of-sight distance. Stowed in PK-2 pararaft kit. Supplements AN/PRC-32. To be replaced by AN/PRC-49 or AN/URC-39(XN-1) depending on which unit proves to be more satisfactory as a result of fleet evaluation.



PRT-3



PRC-32



PRC-17

AN/CRT-3. Gibson Girl life raft radio beacon operating on 500 kc or 8364 kc. Approximate weight of 40 pounds with self-contained, hand-operated generator. Keyed, carrier wave emission and unit requires 300 foot long, balloon-raised antenna for operation. Range is highly variable depending on frequency, atmospheric conditions, antenna condition and other factors which influence low frequency radiation. Stowed in multiplace life rafts. In service since early in World War II. As recently as December, 1959, it was instrumental in an SAR plane keeping in contact with the 10 survivors of a P5M ditching. (See "Man Ditching Stations," April 1960 APPROACH.)

Equipment Being Tested

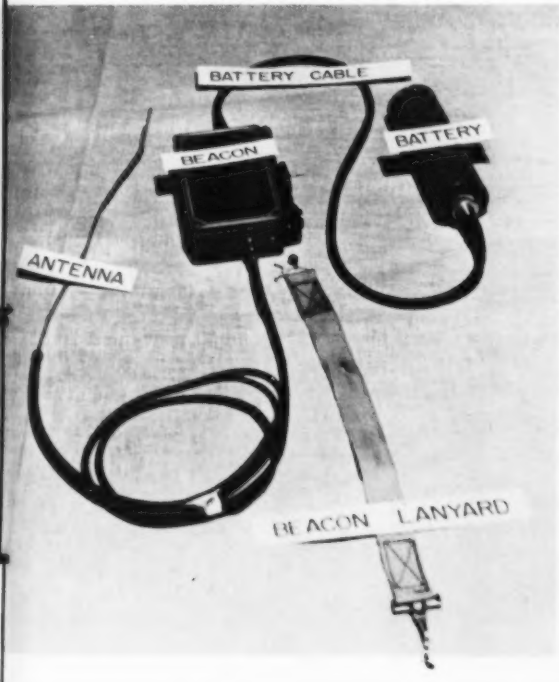
Four pieces of equipment are under limited procurement for testing:

AN/PRC-49. Telephonics Corporation personal two-way voice radio plus beacon operating on 243.0 mc. Total weight including battery is 3 pounds with battery in separate package. Transistorized unit. Manual operation through switching arrangement plus automatic beacon operation upon parachute deployment with a 24 hour operating life. Beacon has a pulsing audio tone. Range varies with antenna configuration, 20-60 miles within line-of-sight distance. Can be stowed on user's person or in the PK-2 pararaft kit. Replaces the AN/PRC-17/17A and AN/PRC-32. Fleet introductory evaluation by ComNavAirLant and ComNavAirPac units scheduled for summer of 1961.

AN/URC-39 (XN-1). Improved AN/URC-10, at one time designated CM-106A. Personal two-way voice radio plus beacon operating on 243.0 mc. Manual operation through simplified switching arrangement plus automatic beacon operation upon parachute deployment with a 24-hour operating life. Steady audio tone on beacon mode. Range varies with antenna configuration. 20-60 miles within line-of-sight distance. Can be stowed on the user's person or in the PK-2 pararaft kit. 25

CRT-3

PRC-49



evaluation units under procurement. Back up item and comparative testing to AN/PRC-49.

HOPE Radio Beacon. Personal radio beacon operating on 243.0 mc. Total weight including self-contained battery is 1.1 lbs. Transistorized unit. Automatic beacon operation upon inflation of user's life preserver. Manufacturer claims 40 hour operating life. Beacon has steady audio tone. No range information is available at this time. Unit is stowed on user's life preserver.

AN/SRT-23 (XN-1). Crash locator beacon externally mounted on helicopters for drop during ASR operations. Total weight including self-contained, non-replaceable battery is 8 pounds. Automatic operation on dropping with a 48 hour operating life. Range tests have not been completed at this writing.

Development Programs

Development programs being initiated include development of a smaller, more powerful automatically ejectable locator for high performance aircraft and a lightweight, battery powered replacement for the AN/CRT-3.

HELO DUNKER

A helicopter dunker training device has been built for the Naval Training Device Center by Kellett Aircraft Corporation and is being evaluated at Camp Pendleton. Used in conjunction with a training tank or pool, the portable ground-based device simulates underwater escape conditions. It is designed to train groups of 10 men, one of whom acts as the heli-team leader.

The dunker has two parts—a mock-up of the fuselage section of an HUS-1 and a crane. The fuselage is equipped with a full complement of seats and safety belts for pilot, copilot and troops. The specially designed crane hoists, lowers and rolls the fuselage either in air or submerged in a tank or pool to simulate conditions that could exist in reality. The crane can train through an arc of 105 degrees and place the fuselage over the edge of the tank or the water. It can lower the fuselage to a maximum depth of 15 feet in the normal or upright attitude or with a roll to a maximum of 90 degrees either right or left.

An operator manipulates the device from the operator's console. An instructor is in charge at all times at the edge of the pool. To eliminate the possibility of hazards to trainees as a result of power failure, the fuselage can be raised from the water by accumulator pressure within the system.

Lifesaving Efficiency

A pilot of an AD-7 which struck the water after failing to become airborne on launch during carquals on a dark moonless winter night owes his life to speedy and efficient rescue by plane guard destroyer.

As the plane sank, he escaped from the water-filled cockpit by using Dilbert Dunker procedure. Just as the carrier passed by, he turned on his life vest flashlight, shed his harness and inflated his life vest. He failed in his attempt to separate his life raft from his seat pack because he only pulled on the lanyard. After he was aboard the rescue destroyer, he remembered the release mechanism which allows the pararaft kit to be removed from the kit container. He stated that in the water he had pictured removing the raft from the pararaft kit instead of removing the kit from its container.

As the parachute pack became waterlogged and heavy, he unfastened the lanyard attached to his life vest and let the raft pack go. It sank immediately.

He fired two tracers. When he saw a destroyer standing off, he fired more tracers. Shortly afterward, he saw the port and starboard running lights of the DD's motor whaleboat. He was helped into the boat by a swimmer and the boat crew.

When rescued, the pilot had been in the water approximately 20 minutes. Although the air temperature was 55° and the water temperature 57° (with 4 to 6 foot waves and a high wind), the pilot was not wearing his antiexposure suit. The flight surgeon reports that, although many of the pilots had their antiexposure suits aboard the ship, none of the pilots wore a suit at any time during the whole two-week carqual period.

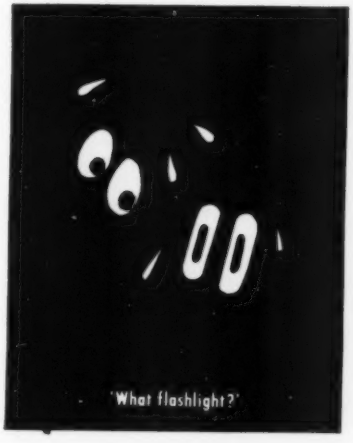
In this case, the pilot got by because of the efficiency of the rescue team.

Individual Responsibility

A crewman, who bailed out of an AD-5W over water after an engine fire, inflated his life raft and climbed into it. Although he had had water survival training, and bailout and parachute lectures during the preceding month, he did not know how to work a day/night distress signal flare.

When he "tried to figure it out," he later reported, he "broke the little pin off." He was able to set off his second flare and, after he had set off a third, he saw a P2V come over and rock its wings. Helicopter rescue followed.

Familiarity with the use of personal survival equipment is the individual's responsibility.



Fire Retardant

In a recent AD-5W inflight fire, the pilot's fire retardant orange summer flight suit afforded him excellent protection, according to the reporting flight surgeon. Although flames came into the cockpit around the rudder pedals, the pilot sustained only first and second degree burns of his left leg.

The suit had numerous small scorched areas where molten metal had struck it. The lower part of the left leg of the suit was charred, corresponding to the pilot's burn in that area. In a flame test on the suit after it had dried, the fabric charred but still did not burn.

MK-3C Inflation

A pilot who successfully ejected from an F3H-2 inflated only one side of his MK-3C life preserver. He intended to "save the other side" in case he needed it later.

When only one side of the MK-3C life preserver is inflated, a portion of that side is bound down by the material covering the other side. This can cause overstressing of the inflated side.

Helmet and Raft

A survivor of an AD-5W bailout left his helmet behind in his pararaft when he swam toward the helicopter. He was being hoisted on to the rescue seat when he realized he had not detached his raft lanyard.

- It is most important for you to keep your helmet on to protect your head during the hoist up to and through the hatch of the rescue helicopter (or during your climb or hoist up the side of a rescue destroyer).

- An attached pararaft is unwelcome extra weight and can foul on the helicopter hatch and wheels.

It
is something
different
when an aircraft
"ground checks no good"
and
"flight checks OK."
But
when
all else
fails...

PERSEVERANCE PAYS OFF!

CARBON monoxide contamination continues to crop up in AD aircraft. Here is a report which tells repeated cases of contamination of one aircraft and the checks and corrective action taken. As can be deduced, perseverance is the byword here. Don't be satisfied until the job is done right.

The AD-6 has recently been involved in four carbon monoxide contamination incidents within a two-week period. Carbon monoxide poisoning of pilots flying this aircraft was sus-

pected in two cases and definitely established in two other cases.

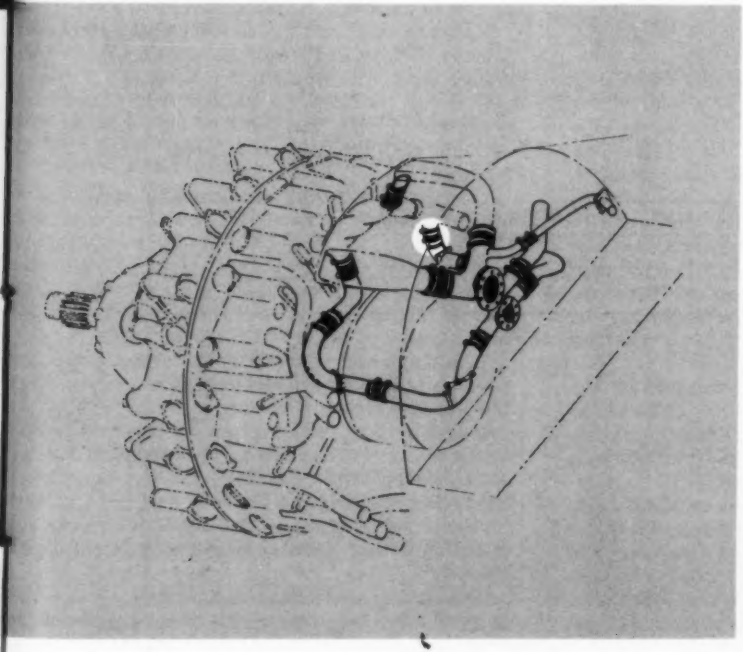
Poisoning could not be established after the first two cases, as no medical examination took place. However, colorimetric tests in flight produced negative results. It was therefore concluded that contamination, if any, had occurred during ground operations with the canopy open. Pilots were again cautioned to keep their canopy closed during ground operations in a crosswind, and also were indoctrinated on the causes, effects of, and remedies for carbon monoxide poisoning. Pilots were reminded of the necessity for a medical test in all cases of suspected poisoning. This aircraft, after several flights without incident, was reported contaminated the third time—the pilot receiving 15 percent carbon monoxide saturation of the blood. A careful review of the history of the flight again indicated ground contamination. A colorimetric flight test proved negative. The aircraft was flown several times more without complaint. On the next flight, in spite of conducting all ground operations with the canopy closed, the pilot suspected contamination after 10 minutes of flight and used 100 percent oxygen for the remainder of the flight. After landing, a blood test revealed 25 percent carbon monoxide saturation of the blood.

Extensive examination of the gas seal integrity was begun utilizing smoke generating equipment. Minor leaks were found and sealed in the cockpit heating and ventilation systems, windshield, hell-hole doors, bomb ejector and wing root access plate. The aircraft then underwent exhaustive ground and flight colorimetric tests. Although in-flight tests proved negative, consistent contamination occurred during ground operation in a crosswind with the canopy open (.04 colorimetric reading). The aircraft was then placed in an up status with appropriate ground operation limitations imposed. No further indications of contamination have occurred.

It was noted that substitute hose (part no. S-2329441-12) is being utilized in the cockpit heating system connections as the correct item (part no. S-2329441-12-14) was not available in the supply system. Leakage due to hose deterioration was discovered in the connection between the heater muff and the right-hand cockpit heat supply duct (NavAer 01-04 ALF-504, pg. 336, fig 153, item 26). It is believed that cockpit contamination via the heating and ventilation system due to deteriorated hose connections is a definite possibility. Therefore, it is recommended that the suitability of the substitute hose be re-evaluated and that the correct hose be made available.

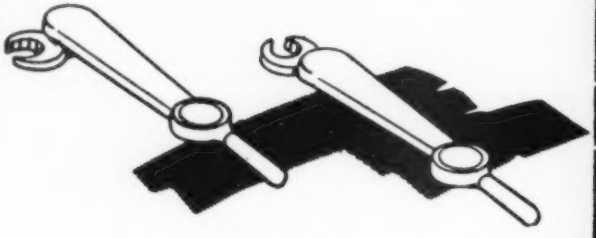
This aircraft has a high-time engine which omits a greater than average amount of oil smoke below 1200 rpm. (Oil consumption, however, is within limits.) It is believed that this may be a causative factor in the apparent susceptibility of this aircraft to contamination during ground operation. All pilots have been instructed to take appropriate precautions pending the forthcoming engine change on this aircraft."

—VA-176

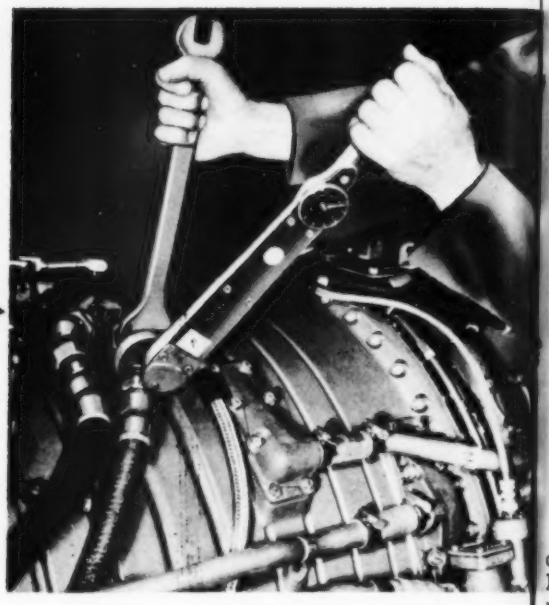


(The requirements for reporting carbon monoxide contamination are contained in BuWeps Instruction 3750.4 of 16 Sept 1958 with change 1 of 12 Mar 1959—CO Contamination; Prevention of, *and BuMed Instr 6510.4A of 29 March 1955*—CO Blood Concentration in Aviation Personnel; Determination of)

TORQUING



B-NUTS



The proper tightening of B-nuts has probably caused more headaches than the maintenance of all other airplane fasteners combined. What is the answer to the question: How is a B-nut properly tightened?

There is only one sure way to properly tighten a B-nut: *Use a torque wrench.* Torque is a convenient way of measuring the preload (static load placed on the fitting and threads) of a nut. When a nut is correctly torqued, the preload is enough to prevent leakage or turning of the B-nut. The preload provides a sealing pressure, as metal is held tightly against metal.

Applying muscle to make certain that connections are tight is *not* a satisfactory way to prevent undertorquing. Overtightening B-nuts may severely damage or completely cut off the tube flares. If tightened properly, a tube fitting may be removed and torqued many times before reflaring is necessary.

Correct torque for a B-nut is determined by the tubing material. The material from which the fitting and nut are made is not a factor. Therefore, torque tables for B-nuts are based only on tubing material.

Torque values are not the result of guesswork. Engineers determine these values through a series of tests. B-nuts on tubes of varying diameters and different materials are tightened to various torques and the lines are then pressure-tested. Satisfactory torque is enough to provide a seal, but not enough to cause damage to the flares or fittings. Tests also are conducted to make sure that prescribed torque values will result in a good seal, even when there are slight maladjustments, such as a misalignment of B-nut and fitting.

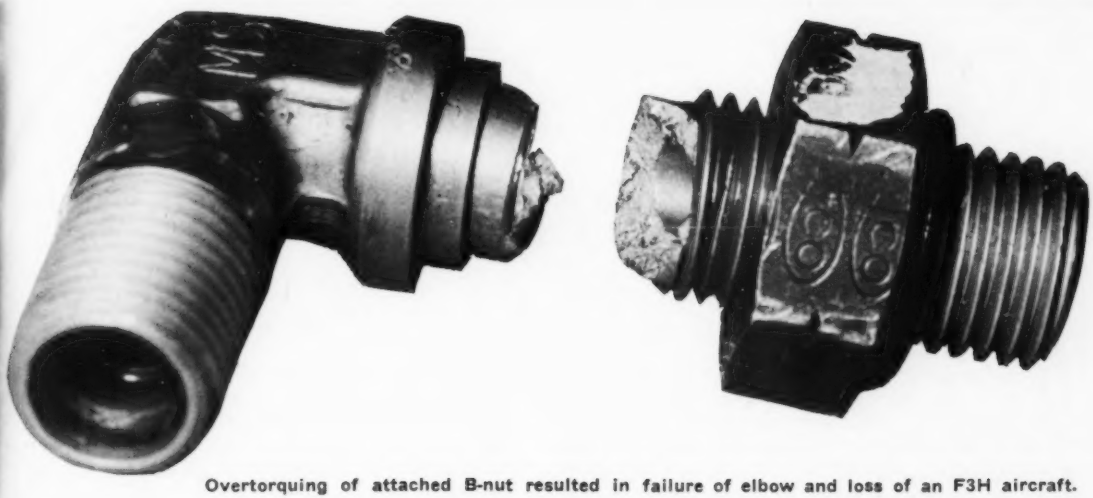
Maximum torque value is low enough to prevent damage to flare or fitting. Minimum torque value is high enough to result in a good seal.

A B-nut should never be tightened when there is pressure in the line. This tends to cut the flare, without adding any appreciable torque to the fitting.

Leakage of Tubing Connections—Leakage at B-nuts frequently occurs on new airplanes even though these nuts may have been properly torqued before delivery from the manufacturer. Vibration tends to seat the flare on the end of the line to the cone of the fitting. When seating takes place, the torque value of the B-nut becomes lower.

If leakage occurs at a B-nut, dump hydraulic or pneumatic pressure in the particular system where the leakage occurs; then use a torque wrench and retorque nut to values given in the torque table included in the applicable Maintenance Manual. If leakage persists, loosen the B-nut and inspect the fitting cone and inside of the flare for scratches, nicks, or splits. Inspect the sleeve for cracks, and make sure that the sleeve is concentric with the flare.

If the fitting, sleeve, and tube flare appear to be in good condition, reassemble the connection in ac-



Overtorquing of attached B-nut resulted in failure of elbow and loss of an F3H aircraft.

cordance with instructions given in the Systems Maintenance Manual. If the connection still leaks, replace the fitting and/or line assembly.

We have seen that vibration is one of the principal factors for the loss of torque. Others may be movement and flexing of airplane structure during flight, pressure surges, etc. How then, can correct torque be maintained? The answer is the proper application of the correct torque value at the time of the original installation through the use of that all-important torque wrench.

On newer airplanes like the B-70, the answer to ultimate capability in airplanes operating at maximum performance can be summed up in two words—maximum reliability. This so-called "M-R Program" has for some time now included an intensive study of various airplane components toward a design that will actually ensure maximum reliability. As such, those little old "-nuts have come in for a complete diagnosis. The result? A new type of self-locking B-nut that will permanently maintain its correct torque value. Thus, it will be seen that the problem has been recognized, dealt with, and our design studies indicate that this particular problem of B-nut leakage will not be a factor on new airplanes (self-locking B-nuts are not used on the A3J-1).

We can only hope that this first aid information may be of some help while we're waiting for the doctor. In the meantime, the best home remedy we can prescribe are those old-fashioned cure-alls —(1) A torque wrench, and (2) correct torque.

B – NUT TORQUE TABLE

FLARED TUBE AND FLEX HOSE TORQUE VALUES (EXCEPT OXYGEN LINES)

Tube O.D. Inches	5052-0 AL. Alloy Tubing		Flex Hose Assem. and 6061-T6 AL. Alloy Tubing		MIL-T-6845 Stainless Steel Tubing	
	IN. LBS. MIN.	IN. LBS. MAX.	IN. LBS. MIN.	IN. LBS. MAX.	IN. LBS. MIN.	IN. LBS. MAX.
1/8	20	25				
3/16	25	35	30	70	90	140
1/4	40	65	70	120	135	185
5/16	60	80	70	120	180	230
3/8	75	125	130	180	270	345
1/2	150	250	300	400	450	525
5/8	200	350	430	550	650	750
3/4	300	500	650	800	900	1100
1	500	700	900	1100	1200	1400
1-1/4	600	900	1200	1450	1500	1800
1-1/2	600	900	1550	1850	2000	2300
1-3/4	700	1000	2000	2350	2600	2900
2	800	1100	2500	2900	3200	3600

Access Panel Screws

Drilling out one or several flush-head screws in an access panel because the recesses are damaged is costly in man-hours and airplane downtime. When damaged screw recesses prevent easy removal of screws, the time to gain access can often equal or exceed the time for maintenance. Three major problems in removing access panels are:

1) Use of incorrect or worn tools.

2) Use of improper methods during installation and/or removal.

3) Use of wrong length, size, or type of screws.

Phillips head screws are commonly used in access panels because they are easily installed with a variety of available tools. A recess similar to the Phillips is the Reed & Prince. But use of a Reed & Prince driver in a Phillips recess or vice versa will damage the screw. The Phillips recess is capable of developing enough torque, when used with proper tools in good condition, to remove screws of any size even after being subjected to stresses and corrosive environments.

Most cases of damaged screw recesses can be traced to worn tools or attempts to drive or remove screws with a tool of the wrong size. Whenever a driving tip does not engage the screw recess snugly, slippage is likely to occur. Because driving tips are made from hardened steel, the screw recess will more likely be damaged if the tool slips. Figure 1 shows the tips of two Phillips drivers found in use. Both tools should be retired because the vital gripping edges are either worn completely away or are rounded enough to make a sure grip difficult to achieve. When tools are used consistently, wear sufficient to call for replacement can occur in a very short time.

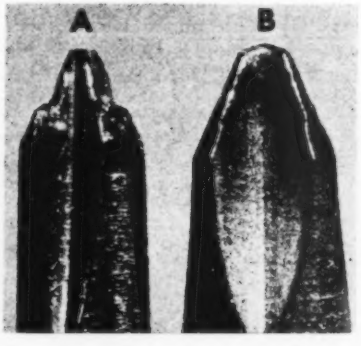


Fig. 1—Worn Phillips driving tips. (A) This tip is obviously unusable and should have been discarded long ago. (B) While not so obvious, vital gripping edges of tip are rounded, indicating this driver should also be replaced.

The various sizes of Phillips head screws require different drivers. Drivers should fit snugly. A common rule should be to use the largest size driving tip that can be inserted in the recess. It is almost impossible to use an oversize driving tip. On the other hand, an undersize driver almost always leads to trouble. A driving tip that is too small bottoms in the screw recess before gripping the edges snugly and cannot develop the full torque capability of the screw. As a result, damage similar to that shown in Figure 2 occurs.

Probably the most frequent damage to screw recesses results from atempts to remove or install screws with a hand-held screwdriver. Test results indicate that a mechanic with strong wrists can normally develop about 50 inch-pounds of torque with a hand-type screwdriver or, under ideal conditions, as much as 60 inch-pounds. A mechanic cannot consistently develop enough axial force directly in line with the screw to keep the driver fully engaged while maximum torque is being applied. This axial force is necessary because Phillips recesses include a slight taper in the cross-slots. Unless enough axial force is applied during driving, the tip will slide out of snug engagement with the screw and damage the recess.

Driving tools which enable a mechanic to apply a high axial force directly in line with the screw's centerline while applying torque help prevent damage to screw recesses. A speed wrench (Figure 3) or a pneumatic nut-runner are recom-

Fig. 2—Structural screw with recess damaged, probably from the use of an undersize driving tip.

mended tools for installing and removing screws.

Normally, most of the difficulty with flush-head fasteners occurs during removal. A screw recess fails when a screw cannot be removed. However, the recess can be damaged during installation.

A pneumatic tool satisfactory for driving a screw may not be capable of removing it. For example, 70 inch-pounds of torque may be used to drive a ¼ inch screw, but 90 inch-pounds might be required to remove the screw a few days later. Obviously, a nut-runner with a clutch set to slip at 70 inch-pounds will not remove such a screw without increasing the clutch torque.

One of the most satisfactory tools for installing and removing Phillips head screws is a speed wrench equipped with a driving tip of the proper size.

Fig. 3—Speed wrench with replaceable driving tip is ideal combination for removing flush-head screws from access panels because axial load keeps tip fully engaged while torque is being applied.

Correct torque should be applied during installation. A recap of the torque settings for flush-head screws is shown in Table A.

Use of an anti-seize compound or additional lubricant of any kind during installation should be discouraged unless definitely specified. Lubricants are sometimes used in the opinion that the screws will be easier to remove.

Torque Required for Installing Flush Head Screws With Phillips or Other Recesses

Screw Size	Torque Range (Pound-Inches)
10-32	20-25
1/4-28	50-70
5/16-24	100-140
3/8-24	160-190
7/16-20	450-500
1/2-20	480-690

Table A

In practice, this may reduce frictional torque during installation, but, unless installation torque is reduced, tension in the screw will be increased, possibly to failure. Later, when the lubricant has deteriorated or because it was squeezed out at installation, more torque will be required to remove the screw than if it had originally been installed without any added lubrication. Also, lubricant used on the threads of a screw will often get into the recess causing a driving tip to slip out more easily.

Using the wrong length or type of screw can also cause trouble. A screw that is too long will allow the unthreaded shank to bottom in the threads of a nutplate before the head of the screw is fully seated. Additional torque during installation in an attempt to drive the head flush will sometimes seat the screw but may also damage the recess in the screw head. When removal is attempted, more than the normal torque is required to break loose the jammed thread in the nutplate. More often than not, the recess in the screw will become deformed before the jammed threads are loosened, and the screw must be drilled out.

Brass or aluminum screws with Phillips recesses must be treated with care, as they will withstand less abuse than steel screws. Regardless of the type of screw, continued installation and removal will progressively damage the recesses. Anytime a screw recess appears damaged, it should be discarded or replaced immediately rather than risk failure during an additional installation and removal cycle.—*Courtesy—FSF Aviation Mechanics Bulletin.*

NOTES

AND COMMENTS ON MAINTENANCE

Checker Shirts

The USS RANGER has recently taken steps to recommend Navy-wide adoption of procedures which proved beneficial during her past deployment. These recommendations, in effect, modify the traditional use of the yellow jersey to designate an officer, irrespective of his billet, and to introduce a new jersey design to positively identify the required Squadron Plane Inspector (Checker shirts).

The RANGER restricts the wearing of yellow jerseys to officer and enlisted men authorized to control or direct the movement of aircraft on deck. Catapult and arresting gear officers are obviously included in this category. This procedure reduces to a minimum the number of "yellow shirts" a pilot sees from his cockpit and assures him that the one he does see is a qualified plane director. This same assurance carries over to all other personnel on deck. The result places special emphasis on handling authority and lessens confusion during deck operations. Instructions require that squadron plane inspectors make a thorough inspection of each plane prior to and as it is towed up to the launching spot. During the 1960 deployment, RANGER substantially increased the safety of launching operations by changing the flight quarters uniform of these inspectors. Instead of the green jerseys of regular maintenance personnel, they were issued white jerseys which had been stenciled to effect a black and white checker-board on front and back.

The new "checker shirt" assured positive identification of the inspector charged with signaling the "thumbs up" or "hold" to the launching officer regardless of the number of "green shirts" present in the launch crew. The value of this "checker shirt" was enhanced during night operations since the checkerboard design was unmistakable no matter what color of light was used to illuminate the plane inspector.

Each squadron or detachment embarked in RANGER must now designate and provide two maintenance petty officers to inspect their respective squadron aircraft just prior to launch. The senior of these inspectors, who wears a "checker shirt," stands nearest the launching officer and is specifically responsible for ensuring the readiness of the aircraft for launch and for signaling a positive "thumbs up" or "hold" to that officer. Whether it be day or night, unless the launching officer receives a positive and emphatic "up" from this "checker shirt," the aircraft shall not be launched.

Lockwire Lesson

On a low-level navigation hop wingman noticed oil on the bottom of the AD-6. Oil pressure started to drop and the flight descended to find a place to land. Oil pressure dropped to ZERO all other temps and pressures normal. Sump light flickered at this time but never came on steady. Wingman picked out suitable field to land and pilot released drop tanks and landed aircraft. Alpha damage—no injury.

Investigation revealed the rocker box drain manifold to scavenge pump tube disconnected from rocker box scavenge pump. B-nut had backed off fitting. Lockwire was not attached, but hanging in place from end opposite of B-nut.

Cause was improper installation of the lockwire.

Booby Trap

Following an arrested landing an A3D was directed to fold wings and proceed to a standby position directly behind the starboard catapult upon which another A3D was readying for launch. The blast deflectors were in the up position. While the first A3D was holding in this position the A3D on the catapult was given a final check and the engines were brought to full power range. The jet blast from these engines, directed at the

From an NASC Endorsement to an AAR

"Service changes are only effective when installed in the aircraft. It is of the utmost importance that follow up action be taken on all service changes to ensure incorporation at the earliest practicable date . . ."

Quality Control—Lacking

QUALITY Control is a term that has gained stature in the last few years. Fifteen years ago if you mentioned Quality Control to the average squadron maintenance man you would probably have received a puzzled look—as if you had spoken to him in a foreign language. Today it is a well-known and accepted term in all aviation maintenance shops. However, the twofold objectives of Quality Control-improvement of material reliability and correction of faulty workmanship, can only be accomplished through well established procedures that are published and adhered to.

The following discussion of an aircraft accident concerns Quality Control procedures that were promulgated but not followed:

Upon completion of his second firing run on a syllabus strafing hop the pilot of an F3H-2 heard a loud thud, followed by a hissing sound and cold air blowing on his right leg. He immediately reduced power and returned to the field where he landed without further incident.

Investigation revealed that the *Demon* had suffered substantial damage because of an explosion of the gun gasses in the gun compartment located in the vicinity of the gun muzzle. It was also found that the blast tube was missing from the starboard gun.

During the investigation the board discovered that the blast tubes are removed from the guns only when repairs or modifications are necessary. Prior to this particular firing hop it had been more than two years since the guns had been fired. Maintenance records did not show that the blast tubes had ever been removed, but they did indicate that the *Demon* had gone through the PAR program at an O&R. Messages were sent to that activity to learn if it was customary to remove the blast tube during conversion on PAR. It was indicated that there was a possibility that this had occurred during the incorporation of F3H ASC 41 and 133—both of which were accomplished at this particular O&R.

In their analysis the accident board stated: "Since there are no other indications that the blast tube was removed subsequent to PAR, . . . it was most probably removed and not replaced during the incorporation of ASC 41 or 133." Furthermore it was discovered that the aircraft had completed a major periodic inspection six days before the accident. One of the items on the inspection checklist required inspection of the blast tube for cracks, distortion and security. This item had been initialed as having been completed and the *check sheet was signed off by the quality control inspector!*

"The fact that this aircraft had completed PAR-Conversion, had been accepted by an operating squadron and completed several periodic inspections, then accepted by this squadron and had undergone two additional periodic inspections without this discrepancy being discovered is beyond understanding. The fact that the guns were checked and loaded just prior to the flight, including probing of the barrels through the area of the blast tube installation further indicates a serious lack of understanding on the part of maintenance personnel of the basic reasons for a periodic inspection.

"It is apparent that the safety of both the pilot and the aircraft is in the hands of the maintenance personnel who perform the periodic inspections and repair or replace malfunctioning systems or equipment. However, the final inspection of the quality control inspector is the one that the pilot must depend upon to insure that the aircraft is truly ready for flight. When this assurance is no longer valid for any one system, confidence in all others is also lost. The only way that this confidence can be regained is for it to be earned by performance.

"The fact that this specific periodic inspection checklist item was missed by the quality control inspectors of PAR and two squadrons indicates a problem area of great magnitude that is in need of correction."

starboard wing of the A3D, unfolded it, thereby breaking the wingfold mechanism.

The ship's flight deck crew had in the past worked with and directed the A3D-2 aircraft on cruise and was unaware of any difference between A3Ds. The basic difference between the one and the two series A3D cannot be readily perceived while looking at the two aircraft simultaneously. The A3D-2 differs in its wing structure, affording a mechanism which locks the wings in a folded position thereby affording a much better defense against blast effect. The ship was advised about blast damage results to the A3D-1 aircraft while the wings are in the folded position. This caution was related at the pre-carrier qualification conference.

Continued

It is recommended that all flight deck directors be advised of the differences between the one and two series A3D, and keep A3Ds with folded wings well clear of any jet aircraft (particularly the A3D) about to be catapulted. There was no apparent dereliction of duty nor carelessness among the ship's flight deck crew.

Gasoline Sniffing

Inhalation of high concentrations of gasoline may cause sudden loss of consciousness, coma, or even death. Lower concentrations may produce flushing of the face, followed by staggering gait, mental confusion, disorientation, ataxia, blurred speech, and difficulties in swallowing—a typical jag. After continued or repeated exposure to fairly high concentrations (chronic gasoline poisoning), the patient may lose his appetite and lose weight. He may look pale and suffer from nausea, headache, nervousness, neurasthenic manifestations, muscular weakness, and cramps. He may become dull and listless, lose his memory, become confused, suffer from analgesias, paresthesias, and myaigia, and may develop polyneuritis and anemia.

Persons vary greatly in their susceptibility to petroleum vapors not containing other poisonous components. About 0.3 percent of gasoline vapor in air will make a man dizzy in about 15 minutes. A man accustomed to breathing the vapors can endure large percentages, but 1 to 2 percent of gasoline vapor will make most men dizzy in 3 to 5 minutes; this percentage will endanger life if exposure is continued for one hour or more. (*Questions and Answers, JAMA 173:1276, July 16, 1960.*)

Ed. Note (Safety Review, May): The standard combustible gas indicator gives reasonably accurate readings in the range of percentages mentioned in this article.—(*NavNews*)

Inspector's Note

During an attempted catapult launch the tow hook tore away from the F3H inflicting substantial damage to the surrounding area and fuselage. Pilot stopped aircraft 40 feet short of the bow. This was the first launching following the inspection.

Investigation indicated the tow hook hold down bolts were *improperly secured* after major inspection.

For Fail-Safe Spring

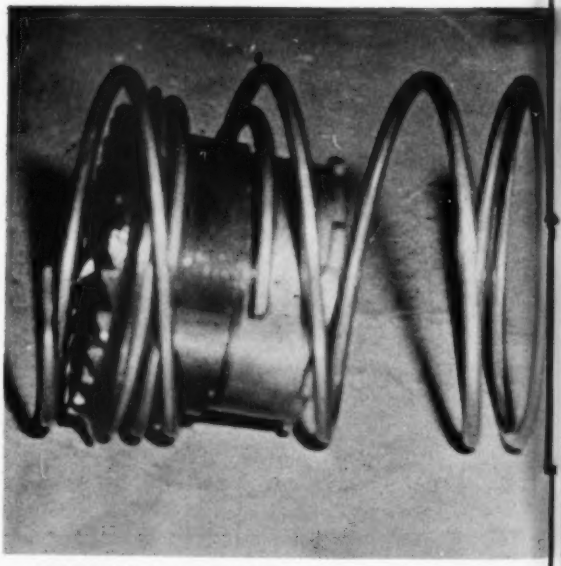
During recovery from a maintenance test autorotation, the HUP-3's engine RPM exceeded the comparable rotor RPM due to non-engagement of the clutch. A full autorotation landing was accomplished with no structural damage. The engine oversped in the execution of the landing. After landing the clutch went into the jaw position with the engine RPM higher than comparable rotor RPM.

The clutch spring had failed, allowing the clutch sliding coupling to back off from the lower bevel gear assembly. The spring is conical in shape and failure occurred at a point where the spring was then of larger diameter than the sliding coupling, allowing it to slip *over* the coupling (see photo) and thence cease to hold the coupling against the lower bevel gear assembly. With the spring in this position the sliding coupling was free floating, and after landing it contacted the lower bevel gear and jawed, causing a severe shock load to be transmitted to the blades.

The reporting unit, HU-1, recommended that:

a. Future design incorporate a back up device (such as an additional smaller inner spring), so that continued flight will not hinge on the reliability of a single spring.

b. Continued emphasis be placed on performing practice and maintenance test autorotations to areas where an actual landing can be effected if necessary.



Broken clutch spring slipped over sliding coupling.

IF the pilot had checked the aileron control system properly during preflight or prior to taxiing, in accordance with the applicable TO or checklist, he would have refused to fly the aircraft . . .

IF a proper supervisory inspection had been accomplished, the aircraft would not have been cleared for flight . . .

IF the mechanics who replaced the cables had tested the movement of both ailerons in relation to movement of both cables, the error in crossing the cables would have been immediately apparent . . .

and one more fatal accident could have been prevented.

This was a T-33. The pilot ejected during a rapid left roll at 700 feet, shortly after take-off on a functional check flight. The terrain elevation was 440 feet, which allowed the parachute only 260 feet in which to open. The attempt was not successful.

The pilot's last radio transmission was that he had control difficulties and could not correct to the right.

Investigators found an improperly installed right aileron cable. It was installed so that the upper cable traveled directly to the aileron drum and the lower cable passed over the pulley antifriction control, causing the right aileron to move in the same direction as the left. This, of course, caused both ailerons to be DOWN when the control stick was held RIGHT, and vice versa. The aileron trim tab was found in the UP position, indicating a futile attempt had been made to raise the left wing with the help of the trim tab but, with both ailerons full DOWN, raising the trip tab UP would spoil the airflow across the left wing, converting it in effect to a small aileron reacting to lower the left wing even further.—

FSF Mech Bulletin

* If an aircraft part can be installed incorrectly, someone will install it that way!

CLIPBOARD

Fly Now—Pay (Hospital Bills) Later

MAN may some day be able to fly by flapping a set of artificial wings, according to two Chilean scientists.

Drs. E. Guerra and B. Gunther of the University of Chile, Valparaiso, say it can be done simply by using the mechanical, biological, electrodynamic and aerodynamic similarities of birds and flying insects as a basis for calculation.

"A 154-lb man equipped with 66 lb of flight accessories would need wings about 10 ft long with a flight surface of 60 sq ft. To maintain a speed of 45 to 90 mph, he should flap his wings 35 times a minute or a little faster than once every two seconds.

"The up-and-down speed of the wing tip should be 15 to 20 mph . . . The force of a single wing beat would be 45 lb.

"The man would be working about as hard as if he walked up 30 steps a minute. Under the right conditions, a man would be able to keep up this pace for from 5 to 30 minutes."

Since birds get along so well with a different density than that of man, the man-powered flying apparatus should be constructed to approximate the density of birds, the scientists report.

Birds sense just how well the flight is going by pressures on the wings as well as the body. The scientists suggest something be done to give a flying man the same advantage.

Drs. Guerra and Gunther conclude that "Man powered flight is possible and should be tested experimentally, because new hypotheses and materials (both metals and plastics) are available which can be used to solve some of the engineering problems involved."—*Design News*

FAA Reprints Manual

THE FAA is reprinting and making available to civilian airmen the Navy's looseleaf 300-page "All Weather Flight Manual," described as one of the most complete textbooks on instrument flying now in print. Manual is available for $3.50 from U. S. Govt. Printing Office, Washington 25, D. C.—*National Aeronautics*

Sonic Boom Test

IN OUR previous correspondence we indicated our belief that sonic booms would not affect the structural or control characteristics of transport type aircraft in a landing condition. Since that time we have run a flight program in which a C-47 was flown several feet off the ground while fighter type aircraft passed directly above the C-47 at distances varying from about 300 feet to 1000 feet and at supersonic speeds. The noise from the shock waves was clearly heard by the pilot of the C-47. The C-47 experienced only a slight bump and no movement of the control column was detected. No rocking, pitching, or displacement of the C-47 was detected. No structural failures or damages were encountered during these tests. These tests support our feeling that there is little concern for the safe operation of subsonic transports resulting from sonic booms generated by present operational supersonic aircraft while either at cruising altitude or near the ground.—ALPA *"Tech Talk"*

Both Are Correctable

LET'S face it, accidents that stem from these causes are human failures, and can be prevented. Unfortunately, accident patterns too often repeat because each of us isn't sufficiently motivated to make the correction personal. We must (1) Insist on alert Line and Maintenance Supervision, then; (2) Know your airplane, (3) Know your equipment, and (4) KNOW YOURSELF . . . Fatigue especially leads to accidents. . . .

NAS Alameda "Newsletter"

Who Dat

The primary task of the Aviation Safety Officer is to administer programs of Accident Prevention and Education, while the primary task of the rest of us is to actively participate and assist in making this program a success. Man as the basic factor in all equations will continue to be the vital ingredient in every success or failure. Therefore, the success our program attains, be it measured in figures or training and readiness, is ultimately dependent on each of us as individuals. — *CNAVanTra "Flight Safety"*

It was a dark, lonely night with fog and a rain soaked sky over NAS Miramar. A *Crusader* pilot, who had been bingoed from USS BON HOMME RICHARD to the beach due to a low fuel state, had experienced vertigo earlier in the night at the ship. Now he was making a GCA to NAS Miramar which was reporting 600′ overcast with 2 miles visibility deteriorating in rain showers.

"The approach progressed nicely until I was about two miles out. At this time I again experienced vertigo," stated the pilot. As he took his own waveoff and was vectored outbound for another approach he reported 1000 lbs of fuel remaining—about enough for one more shortened approach.

At this point B. K. (Buck) Swartwood AC 1, the duty supervisor in the Miramar RATCC, a highly qualified and experienced controller, said, "I'll take this one."

He assumed control when the jet was eight miles from the end of the runway, and in a calm, deliberate manner, began talking the pilot into position.

The aircraft intercepted the glide slope on Swartwood's scope when it was about four and a half miles out.

He continued to talk to the pilot and kept the plane in a good, safe landing pattern until it was a little less than two miles away.

"The aircraft seemed to pull straight up and become so slow that it appeared to stop momentarily," said Swartwood. "I asked him if he was taking a waveoff and he said, 'negative, negative!' Then I knew he had once again gotten vertigo."

Swartwood then told him to "level off, level off!"

Immediately the plane started to level off and then start a descent to the glide path again. An observer, stationed at the end of the runway, saw him when he was ¾ mile away, and the plane landed safely.

The above account occurred at about 2200 on March 27. When it was over Swartwood, in what can only be described as an understatement, said, "Sure hope I don't get many more like that!"

While the plane was still on the runway, the grateful pilot said "You don't know the bad case of vertigo I was experiencing. If it hadn't been for you controlling, I'd have never made it!" And there was "thank you" in his voice.

Swartwood is a veteran GCA controller with 13 years' service and 9 years' controller experience, including 15 months in Antarctica during the wintering over period of '55-'56. His skill in controlling was demonstrated many times while directing aircraft to landings in the notoriously bad weather of Antarctica.

In addition to the gratitude of the pilot, the Naval Aviation Safety Center bestows a Well Done on controller Swartwood for having the initiative and courage to take positive action upon recognizing an emergency situation.—*Adapted from "Miramar Jet Journal"*

PREVENT FOD

PICK UP
FOREIGN OBJECTS